PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

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Hydroacoustic Surveys of Williston Reservoir (June, September, and October, 1988)

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November 1989

PWFWCP Report No. 57

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation: R. L. Johnson and I. Yesaki. November 1989. Hydroacoustic surveys of Williston Reservoir (June, September, and October, 1988). Peace/Williston Fish and Wildlife Compensation Program, Report No. 57. 35pp plus appendices.

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EXECUTIVE SUMMARY

HYDROACOUSTIC SURVEYS OF WILLISTON RESERVOIR (JUNE, SEPTEMBER AND OCTOBER 1988)

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Three hydroacoustic surveys were conducted on Williston Lake on behalf of B.C. Hydro and the B.C. Provincial Ministry of Environment during the periods June 24-July 5, September 1-7 and October 23-November 5, 1988. A draft report was supplied to B.C. Hydro after data analysis in November 1989.

Williston Lake is located in northeastern British Columbia, Canada and was formed by the creation of the W.A.C. Bennett Dam. It has been 23 years since completion of the dam and 18 years since it has reached full pool. In accordance with preimpoundment mandate, a program of environmental compensation is to be undertaken to enhance fish populations in the Williston Lake watershed.

Prior to undertaking enhancement measures, a program of limnological investigations was undertaken in an effort to understand the biology of the maturing system. A baseline hydroacoustic survey of the pelagic zone of the lake was undertaken to better understand the fish distribution and abundance as an integral part of these investigations. Attempts were made to coordinate the hydroacoustic data collection with planned gill net sampling in various locations within the lake during the three sample periods. The objectives of the hydroacoustic sampling were to document the numbers of fish, acoustic fish sizes, and densities of fish for each transect within each survey period and to provide B.C. Hydro with a summary report of the results.

There were 69 transects established on Williston Lake to provide a sample of the pelagic fish population within the lake. The transects were oriented roughly perpendicular to the long axis of the lake and situated at intervals of approximately 5 km. The transects were sampled using a BioSonics dual beam hydroacoustic data acquisition system during hours of darkness in order to afford the highest probability of individual fish detection. Unscheduled diurnal sampling indicated that the pelagic fish are sometimes associated with the submerged trees in the lake during day and emerge into the open water at night.

Data analysis was accomplished using a BioSonics Model

281 Echo Signal Processor (ESP) and Biosonics TS post processing software. Analysis provided information on acoustic fish sizes and volume densities of fish. The surface area of Williston Lake, determined by optical scanning of topographical maps, was used in the calculation of the overall fish population.

The results of the three surveys are summarized in tabular and graphic format in five appendices including population summary tables, target strength vs. depth tables, target strength vs. depth histograms, three dimensional plots of numbers of fish vs. target strength and depth, and the echograms collected during each survey.

The average target strength (acoustic fish size) for each of the three surveys was -44.16 dB (S.D. 6.02 dB) for June, -44.41 dB (S.D. 5.52 dB) for September, and -46.59 dB (S.D. 6.03 dB) for October. A comparison of the acoustically estimated size distribution and the actual sampled size distribution from gill nets proved revealing of the bias associated with the gill net sampling technique. The acoustic data indicated the presence of small fish in the pelagic zone that the gill nets were incapable of capturing. Similar comparisons with trawl samples taken of small fish (juvenile sockeye) in other lakes showed good correlation to acoustic estimates of fish size.

Fish populations were generated for the portion of the lake sampled during each survey as well as extrapolated populations for the entire lake. In July, 51% (35 of 69 transects) of the lake was sampled yielding a population of 2.485E+06 fish. The highest densities in the pelagic region were encountered at transect 49 in the Peace Reach. The extrapolated estimate for the entire lake was 4.899E+06 fish.

In September, 55% (38 of 69 transects) were sampled producing an estimate of 6.182E+06 fish. During this survey, the highest density of fish was encountered at the junction of the three reaches at transect 47. The extrapolated estimate was 1.123E+07 fish.

In October, despite deteriorating weather conditions, 72% (50 of 69 transects) of the lake was sampled. Only 1.030E+05 fish were counted for this survey, a significant drop from the former survey. The largest densities of fish were found at transect 44 in the Peace Reach. The extrapolated population for October was 7.106E+06 fish.

Fluctuations in population from July through October may be attributed to movement to and from the pelagic region of the lake for various reasons. Since the pelagic region of the lake was not adequately sampled with net gear, it is difficult to establish which species may have contributed to the variability in population estimates. It should be noted

that the extrapolation of the population to the entire lake is very rough since the extensive shallows and varying sample areas were not taken into account for this exercise.

A number of recommendations were developed based on this initial baseline hydroacoustic study of Williston Lake.

1. The optimum time for hydroacoustic surveys of Williston Lake appear to be in September when the nights are longer and the fish are utilizing the pelagic region.

2. Future acoustic surveys should be scheduled between the last quarter and the first quarter of the new moon to assure maximum darkness during the sampling period.

3. Transects would be much easier to located at night if they were marked with lights or large reflectors.

4. The survey vessel should be equipped for night work and have trawl capability to adequately sample the smaller fish found in the pelagic region of the lake.

5. The survey design should include a detailed investigation of the populations inhabiting the large inlets and bays of the lake. This would best be undertaken from a smaller boat with a pole mounted transducer in both down-looking and side-looking mode.

6. Fish behavior and gill net effectiveness would be easily monitored by a fixed location hydroacoustic system deployed in conjunction with a gill net sampling site. Gill nets did not appear to be as effective in the pelagic region of the lake as they were near shore.

7. Fixed location hydroacoustic systems may be used in the future to monitor the effectiveness of enhancement structures and utilization of bays and inlets during compensation efforts.

8. Mobile hydroacoustic systems may be used to monitor increased utilization of the pelagic region of the lake after enhancement if properly deployed with conjunctive net sampling (both gill net and trawl).

INTRODUCTION

This report represents the culmination of hydroacoustic studies conducted on behalf of B.C. Hydro (hereinafter referred to as Hydro) and the B.C. Provincial Ministry of Environment (hereinafter referred to as MOE) under Hydro professional services contract purchase order #843 978. Funding was provided through the Williston Compensation Program. The purpose of the contract was to provide services in conducting hydroacoustic surveys of fish populations in Williston Reservoir (hereinafter referred to as Williston Lake), to supply and use hydroacoustic equipment, and to provide summary data of the results of the surveys.

Description of the Survey Area

Williston Lake is located in northeastern British Columbia (Figure 1). The lake was formed by completion of the W.A.C. Bennett Dam located on the Peace River drainage approximately 26 km upstream from the town of Hudson Hope. In 1972, the lake reached maximum pondage at 672 m above sea level, resulting in Williston Lake being the largest body of water in British Columbia (Barrett, et al, 1985). The meristics of the system are impressive with a total surface area of 156,968 hectares and a total volume of 6.436E+10 cubic meters at the 665 m lake level above sea level.

Impoundment of a lake or river system can cause considerable environmental changes which in turn affect the resident and migratory fish populations (Odum 1971). Studies performed by Swedish and Soviet scientists (Nilsson 1958, Grimas 1961, Lindstrom 1962 and Frey 1967) all indicate a pattern of change that occurs in new lakes formed by impoundment. Initial rapid increases in population were noted at all trophic levels. This occurs for the first few years after which significant declines in population were noted. Additionally, as one might expect, those species most adaptive to the lacustrine environment became dominant as the others declined.

It has been 22 years since completion of the dam and 17 years since the reservoir first reached full pool, thus the system should be relatively stable at this time. According to pre-impoundment mandate, a program of environmental compensation is to be undertaken to enhance fish populations in the Williston Lake watershed. Part of the task involves understanding the biology of the maturing system,

Figure 1. Location of Williston Lake and acoustic transects used in 1988.

particularly with regard to the vast lacustrine environment created by the impoundment of the Finlay, Parsnip, and Peace drainages. The objective of this portion of the study was to provide Hydro biologists with information on fish populations and distribution of fishes inhabiting the pelagic portion of the lake.

Project Objectives

This report represents the dual-beam hydroacoustic surveys completed on Williston Lake during June 24 - July 5, 1988, September 1 - 7, 1988 and October 23 - November 5, 1988. The specific objectives of these surveys were to:

1. Estimate the number of targets on each transect,
2. Estimate the acoustic fish sizes for each transect,
3. Estimate fish densities for each transect,
4. Provide a summary report of the above information.

The application of hydroacoustics to fulfill such objectives has been successfully undertaken and documented over the last two decades (Shotton and Bazigos 1984, Dickie et al. 1983, Thome 1983, Traynor and Ehrenberg 1979). Recent and major advances in digital electronic and microcomputer technology coupled with their common and reasonably inexpensive availability has resulted in hydroacoustics becoming even more important, reliable, economical, accurate and rapid (Johanneson and Mitson 1984, Forbes and Nakken 1972). Hydroacoustics has consequently provided a new and accessible opportunity to efficiently evaluate and manage fish stocks.

METHODS AND MATERIALS

Data Collection

Williston Lake is divided naturally into three distinct regions defined by the respective drainages forming the lake basin; the Parsnip Reach to the south, the Finlay Reach to the north, and the Peace Reach to the east (Figure 1). In total, 69 transects were established approximately 5 km apart in the three reaches (1-22, 23-46, and 47-69, respectively) and oriented roughly perpendicular to the lake shore and spanning nearly the entire width of the lake in most cases. Exceptions to this were transects in the Finlay and Parsnip reaches that exhibited extensive shallows with standing trees. It was virtually impossible to navigate these waters during hours of darkness without risking loss of equipment. For this reason, transecting in the shallow regions was confined to the main channel. Two additional transects were added during the program (transects 23A and 25A). Transects were navigated using compass and visual bearing. It is recommended that future hydroacoustic programs include time to adequately mark transects for ease of location and repeatability during hours of darkness. The field log for each of the surveys is presented in Tables 1-3.

Each of the transects was sampled using dual-beam hydroacoustic equipment during hours of darkness. All of the hydroacoustic surveys were conducted at night because previous work, particularly on juvenile sockeye salmon had demonstrated that they generally feed in midwater during hours of darkness and are best distributed for acoustic detection at this time. During the day, the fish are grouped closer to the bottom and are harder to detect with the acoustic gear (Burczynski and Johnson 1985). This phenomena was verified on two occasions during the course of the survey activity on Williston Lake during the 1988 sampling season. During the November survey, it was necessary to survey a portion of the lake during daylight hours due to snow conditions which made night navigation impossible (refer to field log data for transects affected).

The boat RPM was held constant for each vessel used to produce a speed of approximately 2-3 m/sec. The transducer was towed alongside the boat at a depth of one to two meters and oriented looking straight down.

Gillnet sampling was conducted by Hydro staff in conjunction with the hydroacoustic sampling, however, the effort was largely concentrated in the littoral region of the lake. The pelagic sets that were made were typically

Table 1. Field log for Williston Lake survey of June 24 - July 5, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
24/6/88	1	21	300	4352	2229	2310	Gr= +6dB, 40 log R PW 0.4ms, chart thresh. 0.05 v, 3000 rpm course: 245 deg.
	1	22	4352	1:2352	0006	0047	choppy from mid- lake to east shore course: 27 deg.
25/6/88	1	46	1:2353	1:4300	2340	0000	hit log mid transect twilight course: 30 deg
	2	45	300	1712	0019	0034	still twilight course: 207 deg.
	2	44	1714	5531	0107	0156	Ingenika Log dump to S. Point, S. Point to Ingenika Pt. to S. shore course: 28 deg.
	2	43	5531	1:1902	0221	0245	Mark A point on chart hit another log! course: 214 deg.
26/6/88	2	36a	1:1902	1:3441	2137	2152	transecting in Davis Bay recorded random transects
	3	36b	345	4115	2202	2248	transect across lake start in Davis Bay course: 225 deg.
	3	40	4117	1:0740	2359	0026	course: 41 deg.
	3	36c	1:0740	1:4200	0158	0233	repeat after dark course: 223 deg.
27/6/88	4	32	305	5205	2317	0007	many large targets course: 210 deg.
	4	28	5205	1:5243	0217	0329	*Gr= 0dB cut off at 0233 restart at 0241

Table 1. (cont'd.) Field log for Williston Lake survey of June 24 - July 5, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
29/6/88	5	3	300	1615	1158	1213	new boat, rpm start =1400 changed to 1200, Gr = 0dB west to east
30/6/88	5	5	1615	2834	0124	0136	21 min from 3 to 4 at 2300 rpm, trans. 1200rpm east to west
	5	9	2834	3531	0304	0309	east to west
	5	10	3531	5110	0338	0354	choppy in mid transect also boat interferences west to east
1/7/88	5	20	5116	1:3100	0100	0141	very rough & windy east to west
	6	18	303	3525	0230	0302	rpm = 1350 west to east
	6	16	3525	1:0716	0342	0414	full moon, big wind clear sky east to west
	6	25a	1:0716	1:4529	2311	2350	tr. across Omineca Inlet South to north
2/7/88	7	25b	300	14154	0010	0150	clear sky, twilight Windy in main channel course: 30 deg.
	8	47	300	4444	2329	0012	raining south to north
3/7/88	8	48	4444	5845	0058	0112	still raining north to south
	8	49	5918	1:1641	0135	0154	wind & rain west to east
	8	50	1:1641	1:2586	0215	0225	wind from E. & rain south to north

Table 1. (cont'd.) Field log for Williston Lake survey of June 24 - July 5, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
	8	51	1:2506	1:4005	0249	0304	wind & rain south to north
	8	52	1:4005	1:5002	0328	0339	south to north
	9	53	302	1910	0357	0414	north to south
	9	69	1910	5211	2336	0010	calm, partly cloudy course: 40 deg.
4/7/88	9	68	5211	1:2834	0050	0126	course: 0 deg.
	9	66	1:2834	1:5802	0210	0240	light chop course: 340 deg.
4/7/88	10	64	310	2746	0329	0354	moderate chop course: 340 deg.
	10	62	2746	4933	2237	2259	calm, clear, cool course: 120 deg.
	10	60	4933	1:0402	2336	2350	light breeze course: 320 deg.
5/7/88	10	58	1:0402	1:1818	0034	0048	calm course: 310 deg.
	10	56	1:1818	1:3623	0123	0141	calm course: 120 deg.
	10	55	1:3623	1:4727	0224	0236	windy course: 325 deg.
	11	54	300	1334	0313	0324	calm course: 350 deg.

Table 2. Field log for Williston Lake survey of September 1 - 7, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
1/9/88	1	48	304	2230	1049	1109	Gr= 0dB, 40 log R PW 0.4ms, 1050 rpm course: 320 deg.
	1	49	2230	3841	1129	1146	Gr= 0dB, power low, turned off O-scope, lights bright half moon, light breez course: 30 deg.
2/9/88	1	50	3842	5017	1211	1223	Gr= 0dB, choppy from west course: 355 deg.
	1	51	5017	1:0905	1244	0104	Gr= 0dB, course: 10 deg.
	1	52	1:0905	1:1930	0135	0145	Gr= 0dB, course: 346 deg.
	1	53	1:1930	1:4127	0207	0230	Gr= 0dB, course: 160 deg.
	1	54	1:4127	1:5147	0250	0301	Gr= 0dB, choppy course: 0 deg.
	2	55	304	1921	0338	0355	Gr= 0dB, course: 355 deg.
	2	56	1931	3257	0425	0439	Gr= 0dB, 150m offshore start due to forest in water course: 300 deg.
	2	57	3258	1:1116	2102	2140	Gr= 0dB, 1100 rpm course: 40 deg.
	2	58	1:1117	1:4800	2238	2316	Gr= 0dB, course: 0 deg.
3/9/88	3	67	300	3638	0013	0047	course: 180 deg.
	3	65	3638	1:0255	1032	0150	Gr= 0dB, course: 0 deg.
	3	63	1:0255	1:3515	0245	318	Gr= 0dB, course: 310 deg.
	3	61	1:3515	2:0215	0347	0415	Gr= 0dB, course: 160 deg.
	4	60	720	2053	0453	0507	Gr= 0dB, course: 320 deg.
	4	58	2053	3826	0525	0543	Gr= 0dB, course: 130 deg.

Table 2. (cont'd.) Field log for Williston Lake survey of September 1 - 7, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
3/9/88	5	21	153	1:1308	2208	2321	Gr= 0dB, waves 3 ft., course: 210 deg.
	5	19	1:1313	1:5145	0000	0039	Gr= 0dB, calm course: 205 deg.
4/9/88	6	18	151	5158	0113	0203	Gr= 0dB, course: 210 deg.
	6	17	5202	1:2326	0225	302	Gr= 0dB, course: 35 deg.
	6	47rep2	1:2326	end	0355	0422	Gr= 0dB, 4 ft. waves wind at 25 mph course: 320 deg.
	7	36	150	4553	2115	2200	Gr= 0dB, course: 225 deg.
	7	39	4555	1:1005	2257	2322	Gr= 0dB, course: 236 deg.
5/9/88	7	40	1:1008	1:3432	0000	0024	Gr= 0dB, course: 41 deg.
	7	41	1:3434	end	0053	0122	Gr= 0dB, course: 205 deg.
	8	43	151	3123	0207	0237	Gr= 0dB, course: 214 deg.
	8	37	3116	4954	0325	0345	Gr= 0dB, course: 215 deg.
	8	32	5100	1:1442	1839	1902	Gr= 0dB, daytime transect course: 30 deg.
	8	30	1:1442	1:4121	1930	2002	Gr= 0dB, dusk course: 16 deg.
	9	25	151	1:2326	2117	2239	Gr= 0dB, night course: 208 deg.
6/9/88	10	47rep2	130	3429	0022	0055	Gr= 0dB, wind course: 320 deg.
	10	23rep1	3432	1:4515	0056	0207	Gr= 0dB, wind course: 210 deg.

Table 2. (cont'd.) Field log for Williston Lake survey of September 1 - 7, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
	11	23rep2	000	5045	0212	0308	Gr= 0dB, course: 30 deg.
	11	16	5129	1:2725	2058	2133	Gr= 0dB, course: 217 deg.
	11	15	1:2728	1:4600	2255	2314	Gr= 0dB, course: 218 deg.
	12	14	150	2215	2332	2353	Gr= 0dB, course:192 deg.
7/9/88	12	13	2222	3920	0010	0047	Gr= 0dB, course 206 deg.
	12	12	3914	4517	0149	0155	Gr= 0dB, course: 222 deg.
	12	10	4518	1:0420	0340	0358	Gr= 0dB, course: 182 deg.

Table 3. Field log for Williston Lake survey of October 23 - November 5, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
23/10/88	1	48	355	1926	2022	2037	Gr=+6dB, 40 log R, PW= 0.4ms moderate chop from west, 1100 course: 330 deg.
	1	49	1929	3535	2055	2111	Gr= +6dB, light chop course: 30 deg.
	1	50	3539	4548	2130	2140	Gr= +6dB, choppy course: 330 deg.
	1	51	4550	1:0215	2158	2214	Gr= +6dB, moderate chop course: 330 deg.
	1	52	1:0218	1:1328	2239	2250	Gr= +6dB, course: 180 deg.
	1	53	1:1332	1:3116	2307	2325	Gr= +6dB, course: 170 deg.
24/10/88	1	54	1:3119	1:3807	0003	0010	Gr= +6dB, course: 355 deg.
	1	55	1:3810	1:5019	0057	0109	Gr= +6dB, course: 340 deg.
	2	56	306	1447	0151	0204	Gr= +6dB, moderate chop course: 120 deg.
	2	57	1451	3151	0228	0246	Gr= +6dB, course: 110 deg.
	2	58	3154	4537	0300	0315	Gr= +6dB, course: 320 deg.
	2	59	4540	1:0357	0353	0411	Gr= +6dB, choppy course: 330 deg.
	2	60	1:0510	1:1815	2033	2046	Gr= +6dB, course: 320 deg.
	2	61	1:1819	1:3751	2101	2121	Gr= +6dB, light chop course: 340
	2	62	1:3755	2:0159	2135	2159	Gr= +6dB, course: 165 deg.
	3	63	308	3402	2232	2303	Gr= +6dB, course: 265 deg.
25/10/88	3	69	3405	1:1119	0906	0943	Gr= +6dB, daytime transects** course: 30 deg.

Table 3. (cont'd.) Field log for Williston Lake survey of Oct. 23 - Nov. 5, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
25/10/88	3	67	1:1122	1:3811	1006	1033	Gr= +6dB, light chop, day tra course: 200 deg.
	3	65	1:3811	2:0023	1052	1114	Gr=+6dB, course: 345 deg.
	4	64	304	2523	1141	1204	Gr= +6dB, course: 180 deg.
27/10/88	5	47	318	4500	2145	2228	Gr= +6dB, course: 300 deg.
	5	23	4503	1:5917	2228	2345	Gr= +6dB, moderate chop course: 205 deg.
	6	22	0	1:0342	2349	0052	Gr= +6dB, choppy course: 80 deg.
28/10/88	6	21	1:0345	1:5305	0110	0208	Gr= +6dB, course: 210 deg.
	7	20	304	2852	0255	0322	Gr= +6dB, course: 230 deg.
	7	19	2855	5654	0341	0410	Gr= +6dB, course: 205 deg.
31/10/88	8	3	300	2724	1754	1819	Gr= +6dB, 40 log R, PW= 0.4ms PR= chart on 80m, 1000 rpm course: 140 deg.
	8	4	2727	4346	1847	1904	Gr= +6dB, calm, light rain course: 200 deg.
	8	5	4349	1:0129	1934	1952	Gr= +6dB, course: 200 deg.
	8	6	1:0132	1:1520	2025	2039	Gr= +6dB, course: 180 deg.
1/11/88	8	8	1:1625	1:3812	1739	1800	Gr= +6dB, course: 60 deg.
	8	10	1:3815	1:5230	1844	1858	Gr= +6dB, course: 0 deg.
	9	11	300	647	1919	1923	Gr= +6dB, course: 220 deg.
	9	12	650	1440	1948	1955	Gr= +6dB, course: 220 deg.

Table 3. (cont'd.) Field log for Williston Lake survey of Oct. 23 - Nov. 5, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
1/11/88	9	13	1443	2546	2022	2033	Gr= +6dB, course: 230 deg.
	9	14	2549	1643	2054	2116	Gr= +6dB, course: 190 deg.
	9	15	4646	1:1640	2151	2220	Gr= +6dB, course: 40 deg.
	9	16	1:1643	1:5956	2245	2329	Gr= +6dB, course: 220 deg.
	10	17	201	1:0029	2358	0056	Gr= +6dB, course 30 deg.
2/11/88	10	18	1:0032	1:5252	0124	0217	Gr= +6dB, course: 180 deg.
	11	25	200	end	0530	0732	Gr= +6dB, course: 30 deg. moderate waves, 3 ft.
	12	26	100	4021	0754	0833	Gr= +6dB, course: 210 deg. Day transecting***
	12	30	4024	1:1847	0940	1018	Gr= +6dB, course: 20 deg. calm , light chop
	12-13	32	1:1850	1356	1052	1151	Gr= +6dB, course: 220 deg.
	13	36	1600	1:0532	1524	1613	Gr= +6dB, course: 220 deg.
	13	44repl	1:0532	1:5851	1826	1919	Gr= +6dB, course: 40 deg. transect to south of position on chart, mark on echogram = Ingenika Pt., waves 3 ft, sampling aborted!
4/11/88	14	43repl	200	3806	0758	0835	Gr= +6dB, day transects*** 2.5 ft. waves, rpm= 1150 PR= 2/sec, chart -80m course: 215 deg.
	14	44rep2	3809	1:3556	0906	1004	Gr= +6dB, mark #1 -bay ent -rance, mark #2 -Ingenika Pt. day transect*** course: 40 deg.
	15	40repl	202	3649	1652	1728	Gr= +6dB, dusk***, calm, range 80m course: 35 deg.

Table 3. (cont'd.) Field log for Williston Lake survey of Oct. 23 - Nov. 5, 1988.

Date	Tape Number	Transect Number	Counter start	Counter stop	Time start	Time stop	Comments
4/11/88	15	40rep2	3652	1:1257	1729	1803	Gr= +6db, paper speed 1, Dusk-night transition*** course: 200 deg.
	15	40rep3	1:1300	1:4628	1804	5200	Gr= +6dB, night*** course: 35 deg.
	16	43rep2	202	4418	2033	2106	Gr= +6dB, mark -mouth of Chowika Bay course: 200 deg.
	16	38	4418	1:2103	2207	2245	Gr= +6dB, abort due to wind course: 35 deg.
5/11/88	17	37	200	2941	0428	0457	Gr= +6db, course: 220 deg.
	17	34	2944	1:0420	0544	1820	Gr= +6dB, course: 25 deg.
	17	33	1:0424	1:3246	0656	0724	Gr= +6dB, day transect course: 25 deg.

unsuccessful in capturing significant numbers of fish. The gillnet samples will ultimately be used by Hydro to estimate the biomass of fish in Williston Lake.

Dual-Beam Hydroacoustic System

The Biosonics dual-beam hydroacoustic system was used for acoustic sampling and was deployed from three different boats during the course of the study. First, due to unavailability of the scheduled jet boat to be provided by the Ministry of Fisheries, a rental jet boat was used which was not adequately setup to function at night. The second boat used was the scheduled jet boat which functioned adequately, but was out of service for the second survey due to mechanical failure. Its main drawback was its relatively slow speed while traveling between transects. The third boat was the Canadian Biosonics boat which was most suited to working the deep water due to its high speed but it was unsuited to working in the shallow regions of the Finlay Reach and southern most Parsnip Reach at night because of the propeller driven outdrive configuration.

The Biosonics hydroacoustic equipment consisted of a 420-kHz dual-beam transducer (6 and 15 degrees) installed in a dynamic towed body (Endeco V-fin), a Model 105 dual channel echo sounder, a Model 281 Echo Signal Processor (ESP), a Model 115 chart recorder, an oscilloscope, an IBM compatible microcomputer, a Model 171 recorder interface and a Sony digital audio tape (DAT) cassette recorder (see Appendix A). The entire system was powered by 115 VAC provided by a Honda gasoline generator. A block diagram and flow chart of the hydroacoustic system is presented in Figure 2.

A dual-beam rather than a single-beam technique was used because it permitted the fish's acoustic target strength to be determined *in situ* (Burczynski and Dawson 1984, Ehrenberg 1974, 1972). Using this technique, echo returns on two different transducer elements with different beam widths are compared. The beam pattern factor is conveniently eliminated from the measurement, and the output signal is then proportional to the fish acoustic response. Since these measurements are not reliant on net catches or other assumed representative data, they are pertinent to the actual acoustic data being collected. This eliminates the bias associated with net selectivity and fisherman efficiencies. It should be noted, however, that although acoustics is non-selective in nature, user set criteria can represent bias, e.g. setting a high acceptance threshold will discriminate against small fish and setting gains too high can give poor results on large fish if their signals

Figure 2. Block diagram of Dual Beam hydroacoustic system.

saturate the system. If experienced operators are conducting the survey, they will be aware of these potential problem areas and minimize their effects resulting in relatively unbiased information for the biologist.

During data collection in the field, the echo sounder was set to collect 40 log R data which was stored on DAT tapes in digitized format. For dual-beam data collection, echoes were received on both the 6 and 15 degree transducer elements and stored on separate channels on the tape with the synchronization signal multiplexed with the narrow beam channel data.

Data Processing and Analysis

During dual-beam data processing, the data was played back from the DAT tape and standardized with a calibration signal recorded in the field so that the data reproduced in the laboratory was identical to the signals produced by the echo sounder in the field. The dual-beam processor (Model 281 ESP) provided information on the reflective power of individual fish according to Ehrenberg (1984a-b, 1974), Traynor and Ehrenberg (1979). The reflecting power of an individual fish can be expressed as the fish's backscattering cross section or its decibel equivalent, "target strength". Target strength information permits fish sizes and their range to be approximated, as well as allowing the accuracy of the survey to be assessed.

The target strengths for individual fish were determined by the dual-beam processor and post-processing software (Biosonics' TS program) according to the method described by Ehrenberg (1984a-b)(Appendix B). The criteria of amplitude and duration of echo were applied for classification of single fish and other targets. If the amplitude of the echo was between specified minimum and maximum thresholds, and its duration was more than 80% but not exceeding 110% of transmitted pulse length, it was classified as a single fish return and included in the statistics. The maximum threshold was adjusted to 6 dB below the measured bottom echo, and the minimum threshold was set up 6 dB above the background noise. The maximum half angle for processing targets was set at 5 degrees due to the sparseness of targets in this survey. The optimum threshold would have been closer to 3 degrees according to Traynor and Ehrenberg (1979), however, the sample volume would have been substantially reduced at that threshold. The processing parameters are listed in Appendix A.

The post-processing software was used to calculate the mean values of target strength, backscattering cross section and density of individual fish according to the classification criteria. The mean acoustic fish size and range of sizes were also calculated (Love 1977).

The accepted target data generated by the post-processing software was subsequently loaded into a general purpose spreadsheet for final computation of transect populations. The TS program computed an estimate of sampled volume based on a complete water column defined by the selected depth strata. In Williston Lake, the variability in depth of bottom and extensive shallows made this estimate unrealistic. The sample volume estimates were therefore adjusted according to the length of each depth stratum at the stratum midpoint. The resulting densities better reflect the true fish densities according to the actual sampled volume. The current version of the TS program now reads the depth information from the ESP files and automatically adjusts the density estimates.

Additionally, the sampled volume for an individual pulse of sound was adjusted to reflect the average size of the fish encountered on a particular transect. These estimates of sample volume better reflect the true "effective" sample volume than assuming a 5 degree (half angle) beam angle. The "effective" volume half angles are listed at the top of each computational worksheet.

Finally, the number of fish per cubic meter was computed and converted to fish per square meter surface area. The number of fish per square meter surface area was multiplied by the number of square meters for each transect stratum to arrive at a final estimate of the number of fish for that area. The stratum estimates were summed to arrive at a count for each transect area.

RESULTS AND DISCUSSION

Target Strength Results

The target strengths estimated from the dual-beam hydroacoustic technique are tabulated in depthwise frequency tables for each transect in Appendices B1-B3 for the three surveys, respectively. The results are also graphically represented in Appendices C1-C3 and D1-D3. Appendices C1-C3 show depthwise and summary histograms for each transect which illustrate the stratified nature of the targets. Appendices D1-D3 provide three-dimensional perspective to the data for each transect.

Target Strength Distributions

Table 4 lists the acoustic target strength results for the three surveys. The results were reasonably consistent throughout the year with only minor changes noted in the data, particularly in October. The average target strength for June was -44.16 dB with a standard deviation of 6.02 dB. The minimum and maximum target strengths for June were, respectively, -68.06 dB and -18.34 dB. The average target strength for September was -44.41 dB with a standard deviation of 5.52 dB and minimum and maximums of -61.39 dB and -28.64 dB, respectively. And finally, the average target strength for October was -46.59 dB with a standard deviation of 6.03 dB and minimum and maximum of -67.52 dB and -25.51 dB, respectively. The target strengths for the October survey appeared to be slightly lower than those for the previous surveys. The reason for this is unknown. It should be noted, however, that this phenomena occurred in all three reaches with the majority of the samples coming from the Parsnip Reach. The acoustic size distributions are illustrated in Figures 3-5 for each of the three surveys. Some possible explanations for this are that smaller fish were recruited into the pelagic zone later in the year, that the fish had changed their average orientation in the water column resulting in lower echo returns, or that the larger fish in the population were no longer available to the system, e.g. near shore during spawning activity.

Table 4. Average Backscattering Cross-section and Target Strength Summary for Williston Lake Hydroacoustic Survey, 1988

DATE	REACH	# FOR STATS	SIGMA dB	STD DEV	TS dB	STD. DEV. dB	MINIMUM TS	MAXIMUM TS
June	Finlay	399	8.2880E-05	1.5930E-04	-44.82	6.19	-68.06	-18.34
	Parsnip	284	1.4400E-04	5.2040E-03	-44.46	6.14	-67.77	-27.62
	Peace	459	8.7210E-05	1.1430E-04	-43.68	5.57	-60.03	-30.38
	Williston Lake	1142	9.9800E-05	5.0790E-04	-44.16	6.02	-68.06	-18.34
Sept	Finlay	1140	7.6300E-05	1.0020E-04	-44.44	5.76	-61.30	-29.78
	Parsnip	389	6.4440E-05	9.6410E-05	-44.82	5.34	-61.21	-29.59
	Peace	1085	7.3510E-05	1.3050E-04	-44.22	5.32	-61.39	-28.64
	Williston Lake	2614	7.3380E-05	1.0060E-04	-44.41	5.52	-61.39	-28.64
Oct	Finlay	935	7.0550E-05	1.2130E-04	-45.86	6.91	-67.33	-25.56
	Parsnip	2435	4.4490E-05	1.0170E-04	-46.86	5.67	-67.52	-31.45
	Peace	527	4.7200E-05	1.1110E-04	-46.58	5.7	-65.72	-25.51
	Williston Lake	3916	5.1270E-05	1.0920E-04	-46.59	6.03	-67.52	-25.51

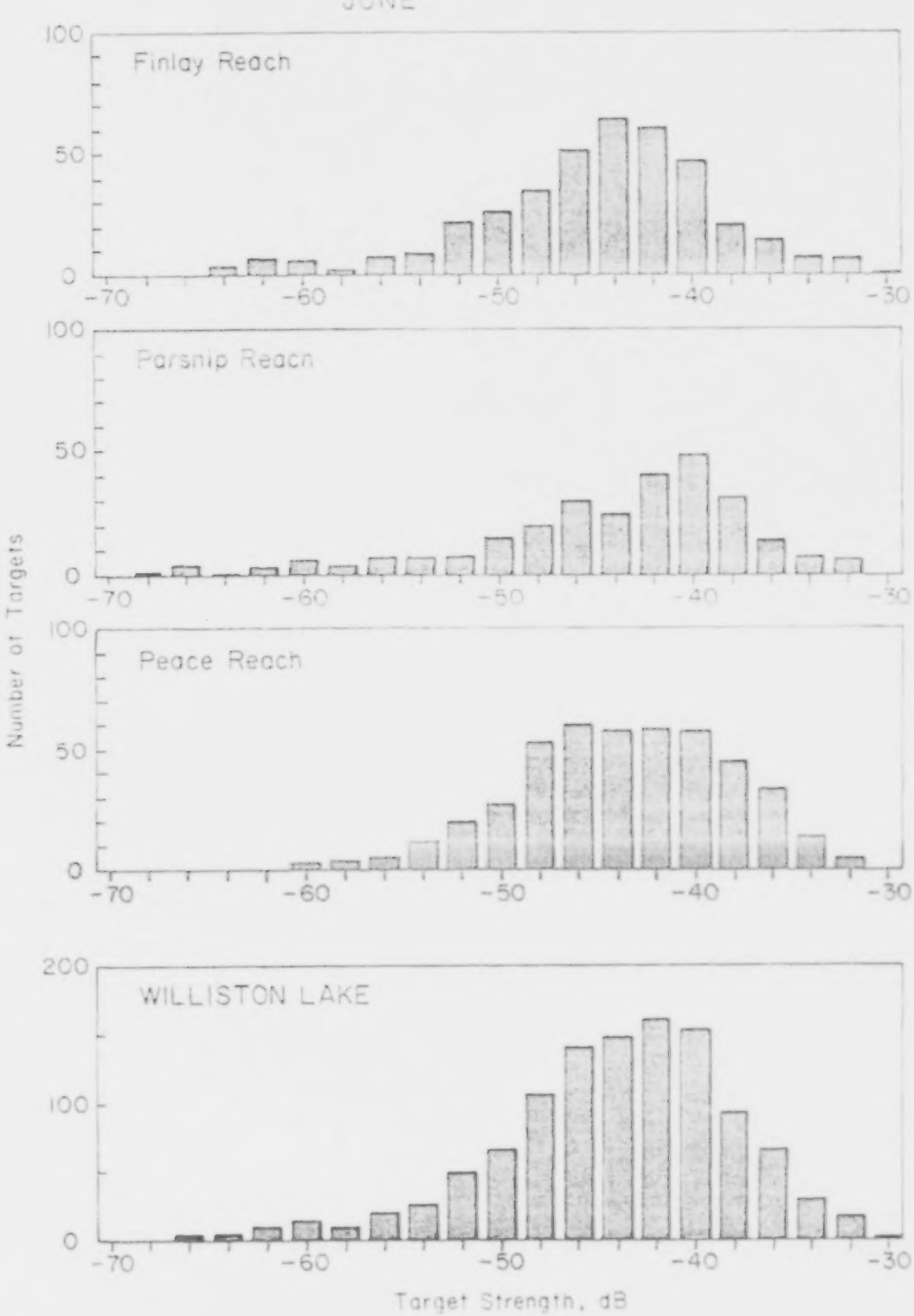

Figure 3. Acoustic size distribution for June 1988.

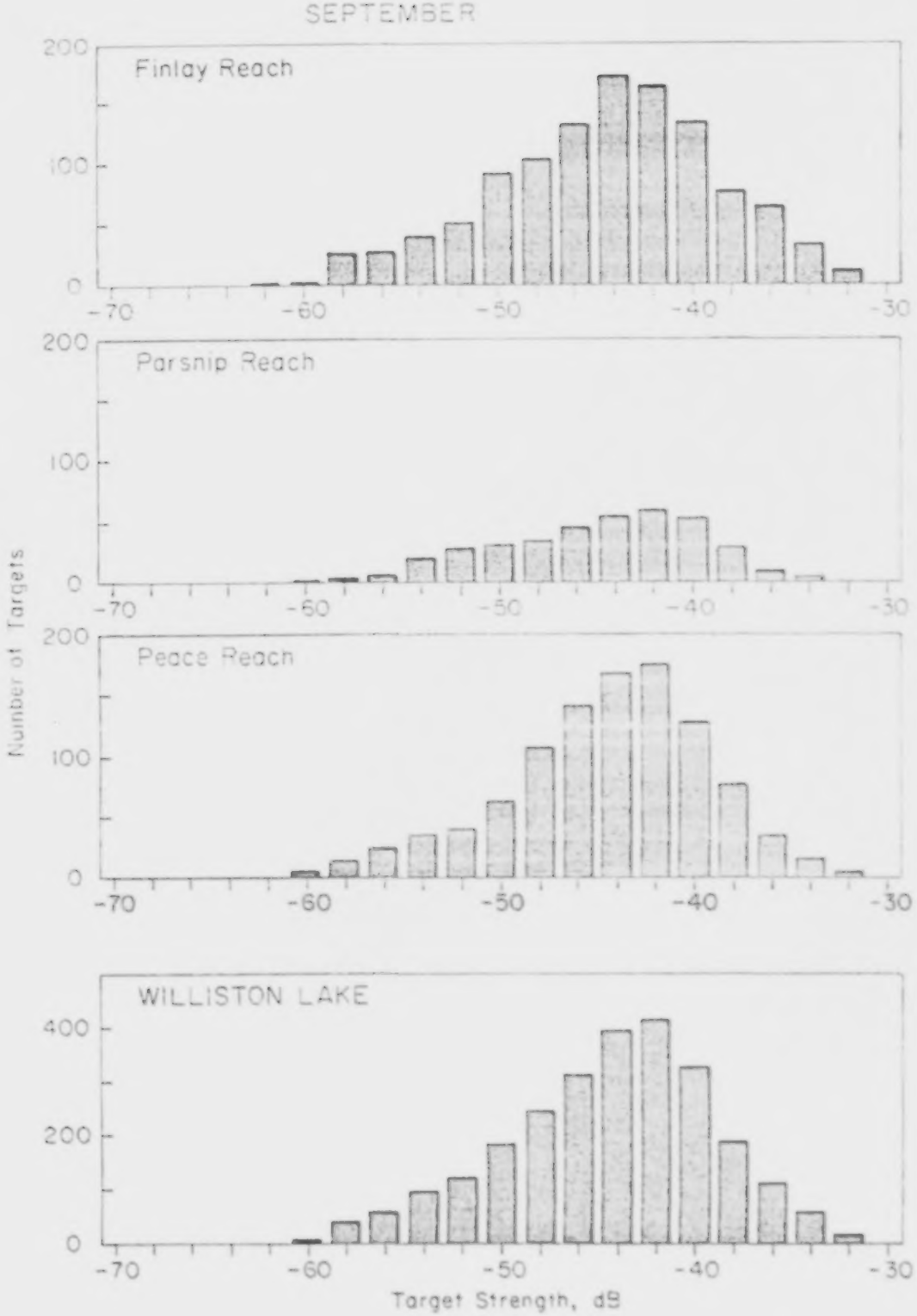

Figure 4. Acoustic size distribution for September 1988.

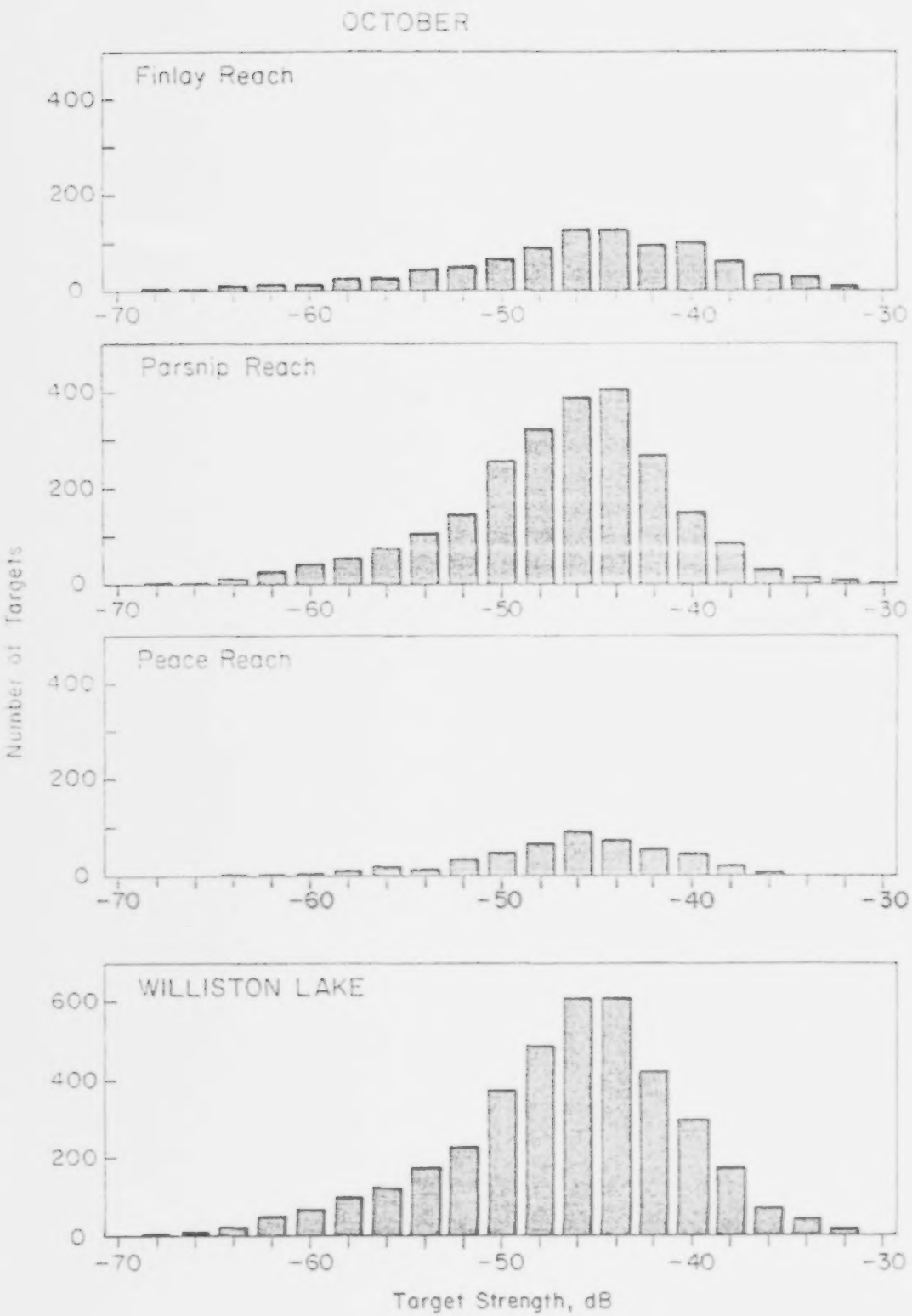

Figure 5. Acoustic size distribution for October 1988.

Target Strength vs Fish Length

The target strength data indicated that there was a substantial spread in fish sizes throughout Williston Lake during all three sample periods. Net sampling during the same periods was mostly limited to the larger fish, suggesting bias in the sampling gear (gill nets) as one might expect. It should be noted that the spread of the acoustic data is partially due to the characteristics of a non-uniform fish backscattering directivity pattern as noted in Burczynski and Johnson (1986). This results in a wide range of potential acoustic returns from a given fish depending on its orientation in the acoustic beam relative to the position of the transducer. The degree of this bias is not known, but, in examining the three surveys it is apparent that it is somewhat consistent. The largest source of bias arises from the physical sampling gear, particularly with respect to smaller fish.

Table 5 summarizes the average equivalent target strengths of fish converted from fish lengths taken in the gill net samples. The average equivalent target strength of sacrificed fish data supplied by MOE and Hydro was approximately -39 dB for all survey periods and all species sacrificed. The minimum size fish captured was 20 mm (-60.26 dB) and the maximum size fish was 850 mm (-30.30 dB). The average target strength from fish lengths proved to be larger than the average target strength determined from the dual beam acoustic data indicating that perhaps the nets were not capable of capturing the smaller fish in the lake. The one small fish captured (20 mm) appeared to be an isolated incident but did substantiate the presence of the smaller fish. Figure 6 shows the distribution of all net caught fish sizes converted to target strengths according to Love's (1977) equation in relation to acoustically estimated target strengths. Figure 7 compares the pelagic net samples converted to target strengths to the acoustically estimated target strengths. The net sampling bias is apparent according to this data.

Density Estimates and Population

The density and population estimates for each of the three surveys are tabulated in Appendices E1-E3. The population distribution is illustrated in Figure 8 for each of the three surveys and the population estimates for each transect are summarized in Table 6.

Table 5. Length and Equivalent Target Strength of Fish from Net surveys of Williston Lake, 1988 (Love, 1977).

DATE	REACH	NUMBER n	MEAN LENGTH mm	STD. DEV.	TS dB	STD. DEV.	MINIMUM LENGTH	MAXIMUM LENGTH	MINIMUM TS	MAXIMUM TS
June	Finley	462	298.63	89.02	-38.95	2.10	136	850	-44.94	-30.30
	Parsnip	272	364.32	91.67	-39.48	2.62	20	795	-60.26	-30.83
	Peace	403	273.91	79.60	-39.76	2.19	158	702	-43.74	-31.82
Williston Lake		1137	305.58	86.32	-39.36	2.26	20	850	-60.26	-30.30
Sept	Finley	no fish samples taken								
	Parsnip	82	268.88	80.64	-39.97	2.40	160	497	-43.64	-34.58
	Peace	406	268.82	63.14	-39.73	1.98	103	470	-47.16	-35.03
Williston Lake		488	268.83	66.08	-39.77	2.05	103	497	-47.16	-34.58
Oct	Finley	468	286.53	83.98	-39.47	1.63	125	750	-45.61	-33.92
	Parsnip	646	251.04	82.19	-40.41	2.31	152	840	-44.05	-30.39
	Peace	414	287.02	60.17	-39.19	1.64	157	630	-43.79	-35.03
Williston Lake		1528	271.66	76.77	-39.79	1.92	125	840	-45.61	-30.39

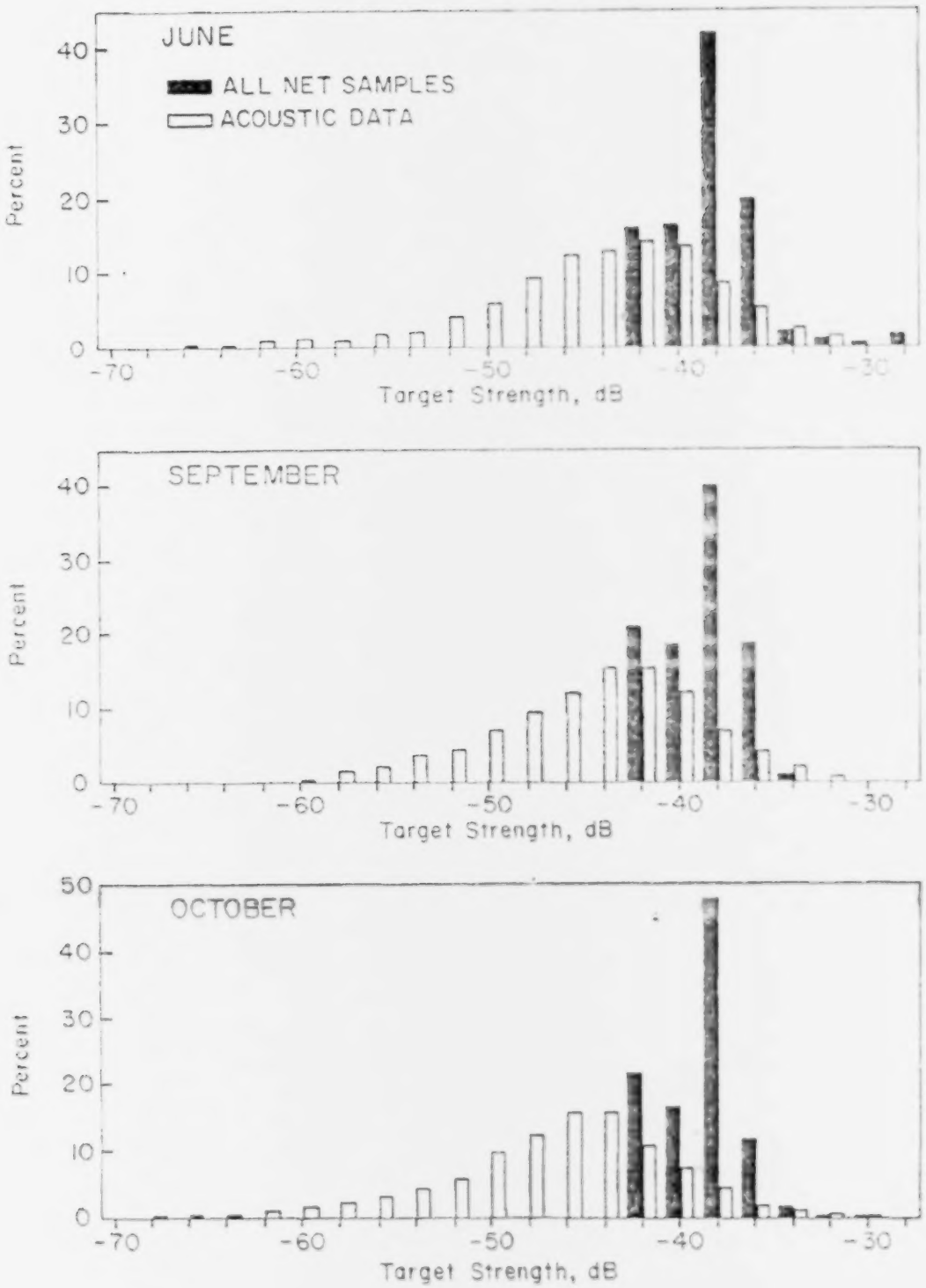

Figure 6. Comparison of fish size distributions from acoustic and all net samples.

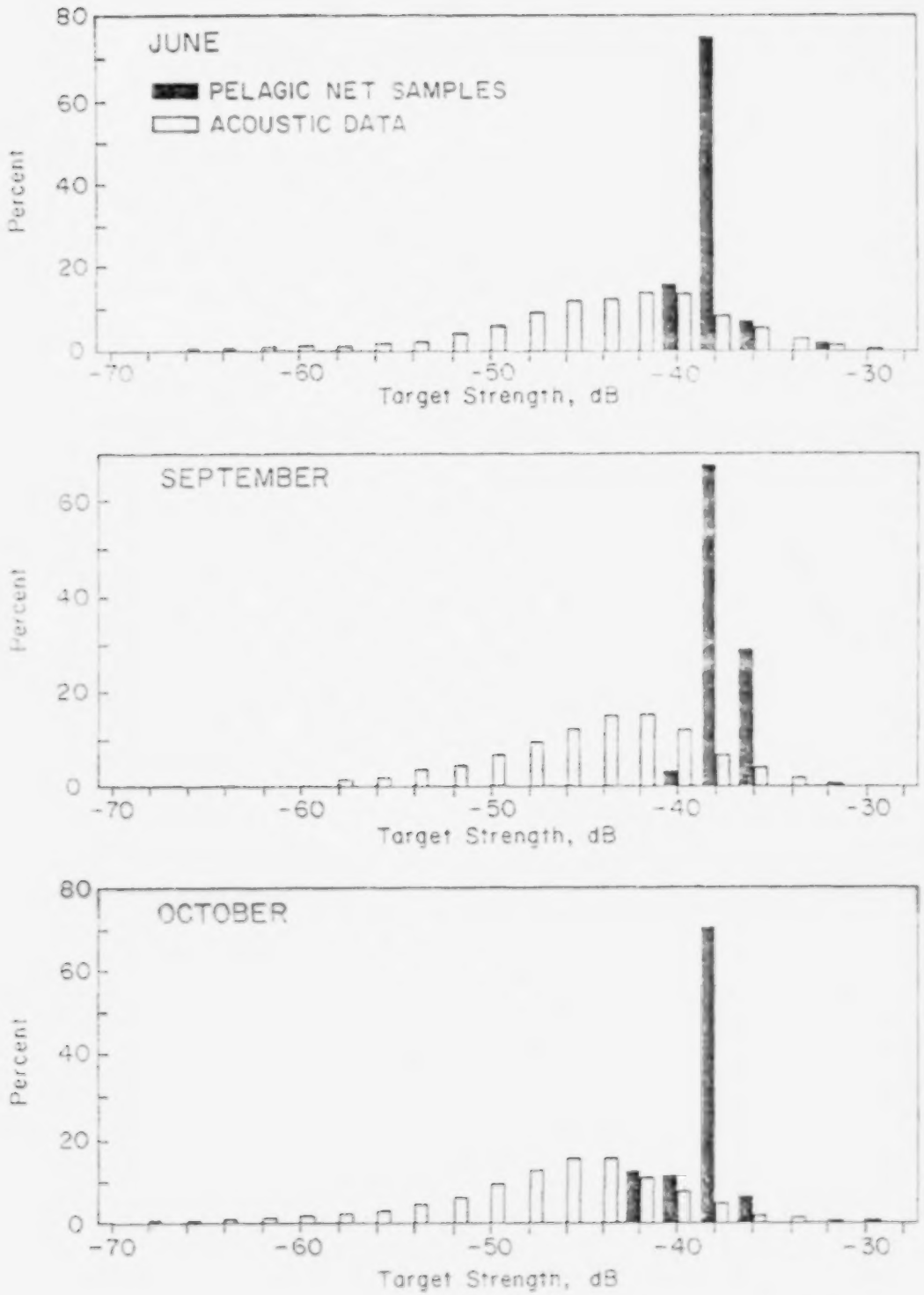

Figure 7. Comparison of fish size distributions from acoustic and pelagic net samples.

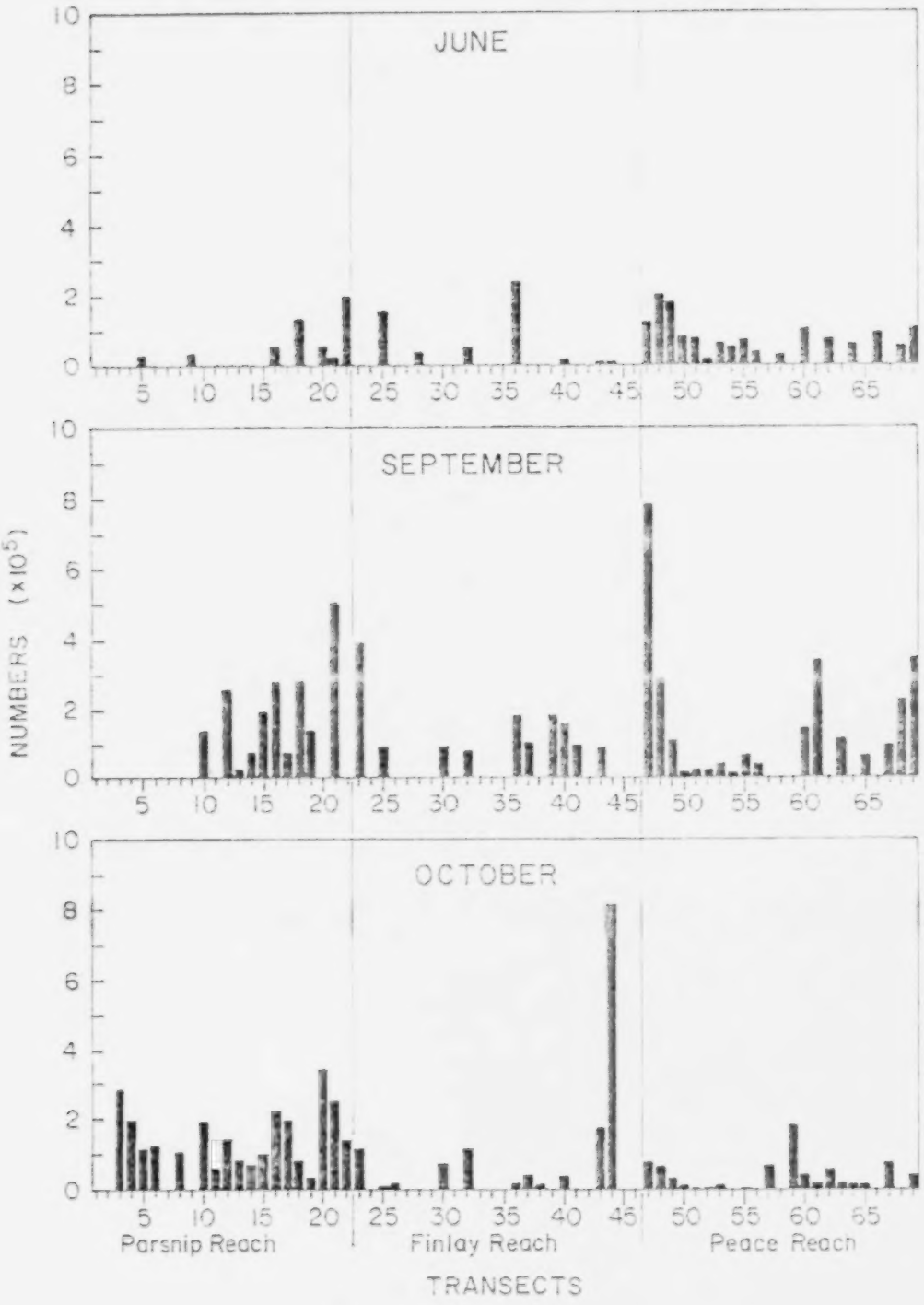

Figure 8. Fish population distribution for the June, September, and October surveys in 1989.

Table 6. Williston Lake fish populations for June, September, and October 1988 by transect.

Transect	June	Sept	Oct	Transect	June	Sept	Oct
1				35			
2				36	239458	179920	18075
3	0		287026	37		101152	46827
4			202645	38			13917
5	29870		119303	39		178631	
6			128344	40	19834	154012	41930
7				41		96911	
8			109807	42			
9	34615			43	8163	89230	182219
10	4992	137244	197293	44	12951		818843
11			66303	45	0		
12		254940	147459	46	0		
13		30647	88045	47	124786	780791	88107
14		75710	71739	48	197743	284223	73610
15		130244	105118	49	179612	107875	39408
16	58055	281622	229066	50	83931	21744	13286
17		74300	200837	51	76171	25673	10202
18	134553	284356	86139	52	15595	24238	10855
19		137151	37897	53	62858	45079	14326
20	57322		342384	54	51496	12863	5749
21	24374	507175	254876	55	71336	70371	6402
22	199103		148585	56	37999	46772	0
23		394035	122099	57			75669
24				58	29809	0	9132
25	160863	89862	13947	59			186041
26			23462	60	104464	141994	45842
27				61		339932	19930
28	39045			62	74268		60959
29				63		114684	25893
30		**89217**	**79549**	**64**	**61054**		**20148**
31				65		66075	17302
32	53938	78865	122038	66	86208		
33				67		98395	79429
34				68	52374	228422	
				69	98198	347662	41457

NUMBER	35	38	50
% SAMPLED	51%	55%	72%
TOTAL	2.4850E+06	6.1820E+06	5.1495E+06
AVERAGE	7.1001E+04	1.6268E+05	1.0299E+05
STD. DEV.	6.1638E+04	1.5431E+05	1.3018E+05
VARIANCE	3.7992E+09	2.3813E+10	1.6946E+10
t(n-1)	2.0320E+00	2.0270E+00	2.0120E+00
95% CL	2.1171E+04	5.0742E+04	3.7041E+04
% CL	29.82%	31.19%	35.97%
ADJUSTED	4.8991E+06	1.1225E+07	7.1063E+06

The July survey was the least sampled of the three surveys, largely due to logistic challenges with the scheduled boats. During the subsequent two surveys, a subset of the total transect pattern was sampled at the discretion of the field supervisor. Thirty five of the sixty nine transects (51%) were sampled with a total population of 2.485E+06 fish estimated. The unweighted mean number of fish per transect was estimated at 7.100E+04 fish with 95% confidence limits on the mean of 2.117E+04 fish. Stratum fish densities ranged from 0 fish/cu. meter to 1.6691E-03 fish/cu meter. The highest density of fish was encountered on transect 49 (1.6378E-02 fish/cu. meter).

In September, the stratum densities ranged from 0 fish/cu. meter to 3.4731E-03 fish/cu. meter with the highest density found on transect 47. Thirty eight of the sixty nine transects (55%) were completed with continued problems with the boat and a decision to down scale the sampling effort by the field supervisor. A total of 6.182E+06 fish were estimated on the sampled transects. The unweighted mean number of fish per transect was estimated at 1.627E+05 fish with 95% confidence limits of 5.074E+04 fish. Larger numbers of targets were detected in all regions of the lake than in the previous survey.

In October, the number of transects sampled was highest with 50 of the 69 transects competed (72%). This resulted in a population of 5.150E+06 fish. The unweighted mean number of fish per transect was estimated at 1.030E+05 with 95% confidence limits of 3.701E+04 fish. Stratum densities ranged from 0 fish/cu. meter to 2.1319E-03 fish/cu. meter in October with the highest density found on transect 44.

Figure 9 illustrates the results of the extrapolation of the mean number of fish per transect area over the total number of transect areas on the lake. This is a rough estimate of total abundance since the extensive shallows and varying sample areas are not taken into consideration. It does, however, show the relative magnitude of the differences between the respective surveys.

Much of the variation in numbers over the three survey periods may have been related to the degree of light during the survey period. The early survey was run under conditions of almost continuous light conditions while the later surveys were run during hours of darkness. Trial transects during the October survey run during day, dusk and night indicated a substantial vertical response to the light conditions. It should be noted that only the night transects were used for population estimation. This would not account for the lower estimate in October, however, since this survey was conducted under maximum darkness conditions. There is insufficient data to suggest why the October population was lower than the September survey.

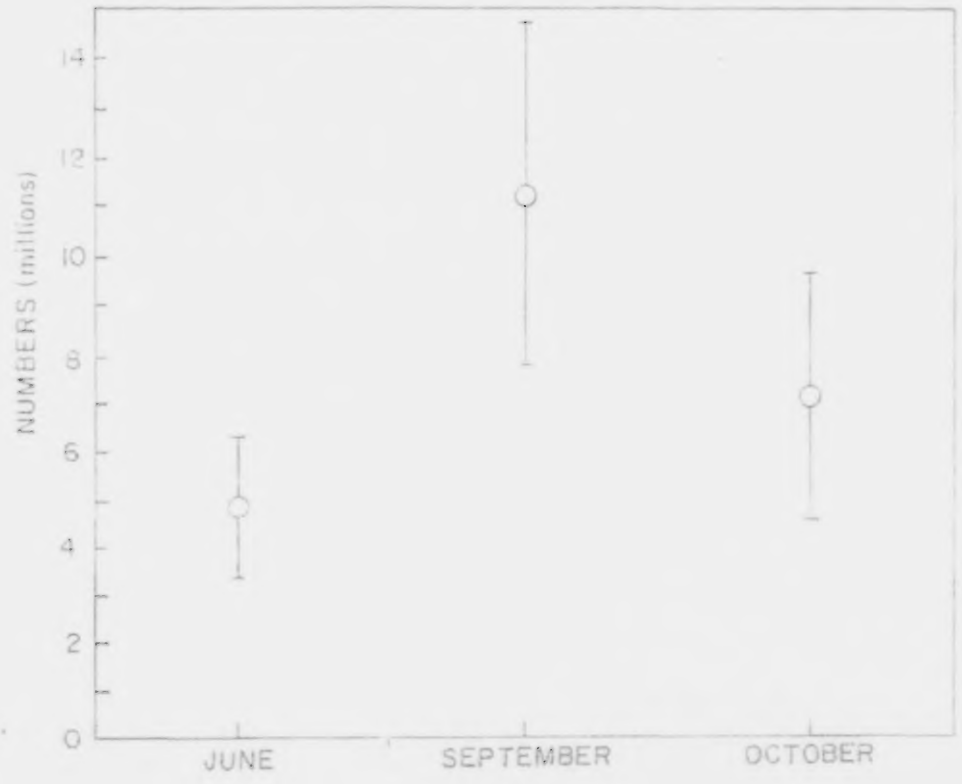

Figure 9. Unweighted extrapolated fish populations, with 95% confidence limits of the mean, for June, September, and October, 1988.

According to the acoustic data collected in 1988, it appears as though the best time for acoustic estimation of the pelagic fish population in Williston Lake is during the month of September and during hours of darkness, preferably between the last quarter of moon and the first quarter of moon to assure maximum possible darkness. Surveys should be conducted using a dedicated boat equipped with a midwater trawl to adequately sample the pelagic water column for smaller fish. Supplementary pelagic gillnet sampling would also be desirable to capture the larger fish. Since this data was collected, considerable improvements have been made to the Echo Signal Processor allowing it to accurately track bottom as well as tracking individual fish. The latter technique may be of value in evaluating the movement of littoral populations of fish in the many bays and inlets on Williston Lake.

ACKNOWLEDGEMENTS

Acknowledgement and thanks to Owen Fleming for his help and expert navigation at night on the treacherous waters of Williston Lake. I owe a great deal to Dave Levy who willingly took my place on Williston Lake during the course of the data collection. Many thanks to the staff of Finlay Bay Cabins for their kind help and to Lottie for many welcome hot meals. This work was supported by contract with B.C. Hydro.

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APPENDICES

6.1 - Appendix A: System components and parameters.

Model numbers of equipment used, hydroacoustic system parameters, and Echo Signal Processor dual beam processing parameters

Model numbers and manufacturer of electronic equipment used by Canadian BioSonics Ltd. on Williston Lake hydroacoustic surveys, 1988.

Model Number/Equipment	Manufacturer
Model 105 Dual Beam Echo Sounder	BioSonics, Inc.
Model 115 Portable Chart Recorder	BioSonics, Inc.
Model 171 Tape Recorder Interface	BioSonics, Inc.
Transducer	BioSonics, Inc.
Model V-352 Oscilloscope	Hitachi
Digital Audio Tape Deck, DTC-1000	Sony
Compaq II 286 Portable Computer	Compaq, Inc.
FX-80 Computer Printer	Epson

Echo sounder system parameters

System operating frequency	420 kHz
Absorption coefficient at calibration	0
Receiving sensitivity at cal. range, channel 1, 40logR	-126.70
Receiving sensitivity at cal. range, channel 1, 20logR	-135.10
Receiving sensitivity at cal. range, simultaneous 20logR	-128.30
Receiving sensitivity at cal. range, channel 2, 40logR	-126.70
Receiving sensitivity at cal. range, channel 2, 20logR	-135.00
Source level, at 0 transmit power	215.30
Transducer is side by side circular dualbeam	
narrow beam width	6.0 degrees
wide beam width	12.0 degrees
Wide beam dropoff	1.238 dB
"A" coefficient for power equation	1.735
"B" coefficient for power equation	.489
Average squared narrow beam patter factor	0.1022E-2
Verage squared composite beam pattern factor	0.1850E-2
Puise width	0.4 mSec

Echo Signal Processor - Dual beam processing paramenters

Narrow beam threshold	200 mV
Wide beam threshold	200 mV
Maximum depth to process	80 m
Bottom threshold (before correction)	5000 mV
Receiver gains used to collect data	0 and +6 dB
Maximum half-angle for processing targets	5 degrees
Signal threshold	50 mV
Bottom threshold	8000 mV
Maximum -18dB pulse width	0.8124 mSec
Minimum -6dB pulse width	0.2668 mSec
Maximum -6dB pulse width	0.4669 mSec
Bottom window size	5 m
Start depth	2 m

6.2 - Appendix B: Dual-Beam analysis methods,

APPENDIX B: Dual-beam Target Strength Measurements and Interpretation

Target Strength and Backscattering Cross Section Calculation

A fish's target strength is a measure of its echo reflecting power. The larger the target strength, the more sound energy the fish will reflect when ensonified by a transmitted pulse. Acoustic backscattering from a fish is a complex phenomenon. The intensity of an echo reflected from a fish depends on a variety of factors including acoustic frequency and the fish's size, orientation, and swim bladder characteristics. (Much of the echo energy reflected from a fish is due to the gas-filled swim bladder.) Despite the many variables that can affect a fish's reflecting properties, empirical relationships have been derived between average fish length and average target strength when measured from the dorsal aspect. (Haslett 1969, Love 1971 / McCartney and Stubbs 1971).

In the last decade, techniques have been developed to measure target strengths of freely swimming fish in their natural habitats (Burczynzki and Dawson 1984; Ehrenberg 1984a, 1984b).

Target strengths are expressed on a logarithmic scale in decibels. Typical values range from -60 dB to -20 dB. The arithmetic equivalent of target strength (TS) is the backscattering cross section (σ_{bs}) in units of m^2 where:

$$TS = 10 \log(\sigma_{bs})$$

For simplicity, the following principles are explained in arithmetic terms*

The voltage output of a single-beam hydroacoustic system is related to a fish's backscattering cross section (and target strength) by the following equation:

$$v^2 = k \sigma_{bs} b^2(\theta,\phi) \qquad (2)$$

where

v = detected output of an echo sounder set at [40 log(R) + 2aR] time-varied-gain. The echo intensity (I) is proportional to V^2.

k = a constant determined from system calibration and equipment settings.

σ_{bs} = backscattering cross section of the fish. This is a

measure of the fish's acoustic reflecting power in the direction of the transducer. Target strength is related to TS by equation (1).

$b(\theta,\phi)$ = beam pattern factor of the transducer. This is the ratio of the acoustic beam's transmitted intensity (I) at the angular coordinates (θ,ϕ) to that at the acoustic axis of the transducer; i.e.,

$$b(\theta,\phi) = \frac{I(\theta,\phi)}{I(0,0)}$$

$b(\theta,\phi)$ is also a measure of the transducer's receiving sensitivity. Because a single-beam echo sounder uses the same transducer for both transmitting and receiving, this quantity is squared in equation (2).

Under controlled laboratory conditions, the values of V^2, k, and $b^2(\theta,\phi)$ can be measured and equation (2) solved for σ_{bs}. However, under field conditions (either mobile or fixed-location surveys), the b^2 value cannot be measured because there is no way to determine a fish's exact coordinates (θ,ϕ) in the beam. In other words, a single-beam system cannot make direct in situ target strength measurements because the fundamental equation (2) contains two unknowns (σ_{bs}, b^2).

A dual-beam system overcomes this problem by introducing a second transducer element, and hence a second equation. The b^2 value is factored out and equations (3) and (4) are solved for σ_{bs}. Specifically, a dual-beam system transmits pulses on a narrow-beam transducer element and receives echoes on both narrow- and wide-beam elements (Figure B1). The narrow- and wide-beam squared voltage outputs are:

$$V_n^2 = k_n \sigma_{bs} b_n^2(\theta,\phi) \quad (3)$$

$$V_w^2 = k_w \sigma_{bs} b_n(\theta,\phi)\, b_w(\theta,\phi) \quad (4)$$

For simplicity of mathematics, assume that a dual-beam system is designed so that $b_w(\theta,\phi) = 1$ over the main lobe of the narrow beam; that is, the effective beam pattern factor of the wide beam is engineered to unity[1]. With this consideration, the ratio of

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[1] It is not necessary that a dual-beam system be designed so that $b_w = 1$ over the main lobe of the narrow beam as long as the relationship between b_n and b_w/b_n can be computed. The BioSonics Dual-Beam System operates with $b_w \neq 1$, but the principles are the same. Differences are corrected using parameters in the post-processing software.

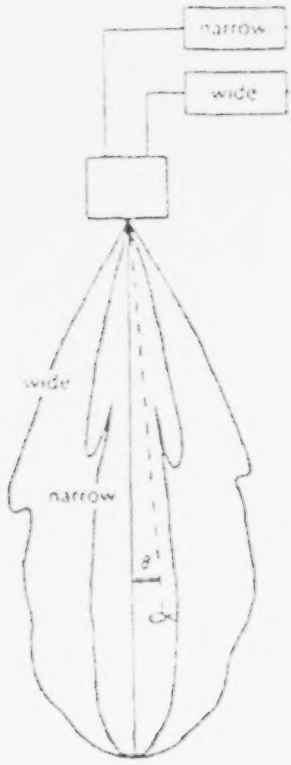

Figure B1. Beam patterns of narrow- and wide-transducer elements showing a fish within both beams.

the squared voltages (3) and (4) from the received echo signal becomes:

$$\frac{V_n^2}{V_w^2} = \frac{k_n\, b_n(\theta,\phi)}{k_w} \qquad (5)$$

Rearranging gives:

$$b_n(\theta,\phi) = \frac{V_n^2\, k_w}{V_w^2\, k_n} \qquad (6)$$

Inserting this $b_n(\theta,\phi)$ value into equation (3) and rearranging allows computation of a fish's backscattering cross section according to:

$$\sigma_{bs} = \frac{V_w^2\, k_n}{V_n^2\, k_w^2} \qquad (7)$$

Target strengths are then computed according to equation (1).

The BioSonics Model 181 Dual-Beam Processor operates by first selecting only single target echoes based on the single-echo detection criteria entered by the user. Maximum amplitudes of these echo signals (V_n and V_w) are then used to calculate σ_{bs} for individual fish. The σ_{bs} values are then converted to target strengths in dB, as described below.

Procedure Followed to Relate Acoustic Size (i.e., Target Strength) to Fish Length

The echo reflecting power of fish, which is commonly expressed as target strength or backscattering cross section (σ_{bs}) can provide a good estimate of the size of acoustically sampled fish. The target strength in dB and backscattering cross section in m^2 of sampled fish can be measured by the dual-beam echo sounder where

$$TS = 10 \log (\sigma_{bs})$$

The principles of a dual-beam sounder are given in Burczynski and Dawson (1984) and Ehrenberg (1984a,b).

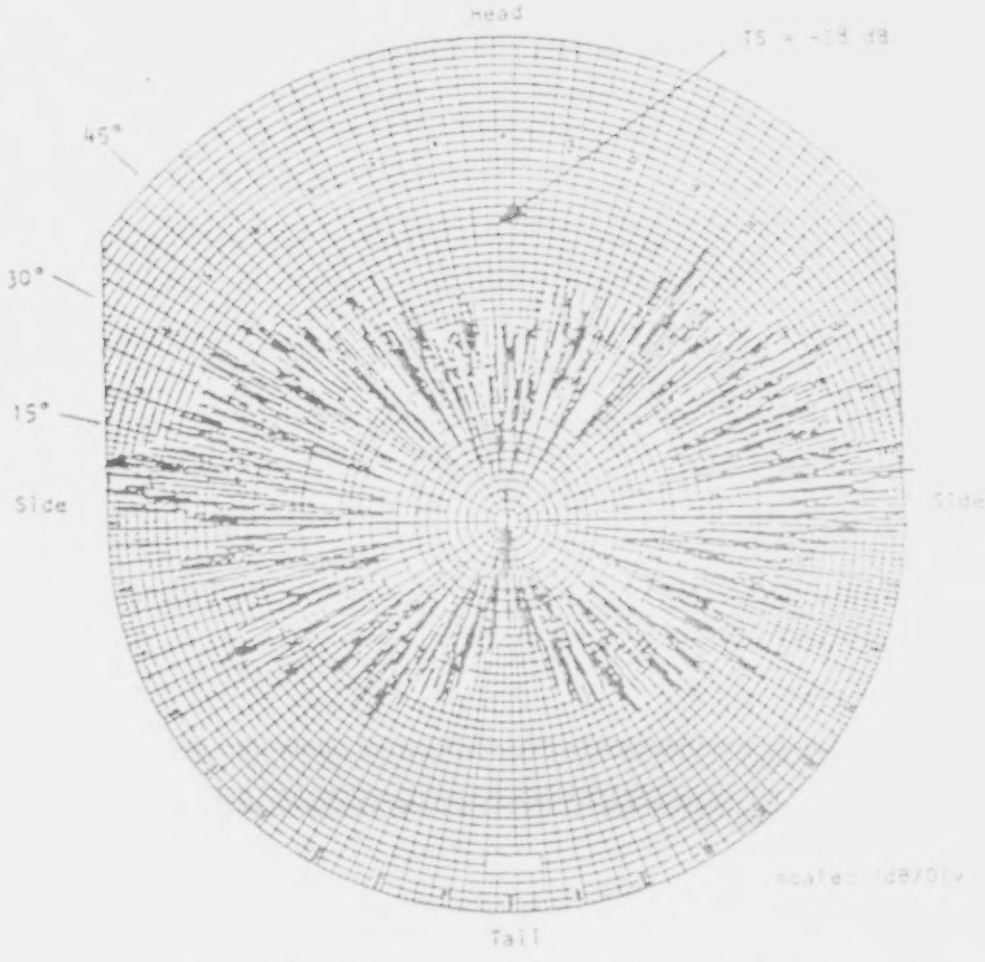

Figure B3. Polar plot (420 kHz) of fish directivity in the yaw plane for a 52 cm salmonid (Dahl 1982).

In general, larger fish reflect more acoustic energy than smaller fish. However, acoustic backscattering from fish is a complex phenomenon and the intensity of the reflected echo depends on many factors, including the fish's orientation toward the transducer, it's size, anatomy, and swim bladder characteristics, as well as the acoustic frequency used. While much of the acoustic energy reflected from a fish is due to its gas-filled swim bladder, species without swim bladders can also be good acoustic reflectors.

Despite the many variables that can affect fish reflecting properties, Love (1971) derived an empirical relationship between average fish length and average target strength when measured from the dorsal aspect. The relationship is based on Love's laboratory measurements on 8 species of fish (anesthetized) and data from at least 16 other species as reported by other researchers. Expressed in terms of acoustic frequency, Love's formula is:

1) for individual fish ensonified from the dorsal aspect:

$$TS = 19.1 \log(L) - 0.9 \log(f) - 62.0$$

where TS = target strength (dB)

f = frequency (kHz)

L = fish length (cm)

For salmon and some other species, Biosonics has found that the Love formula applies well to in situ measurements of target strengths using the Dual-Beam System. In joint dual-beam acoustic and trawl surveys, the average TS of fish populations, as measured by the Dual-Beam System, correlated well with the average measured length of the trawl-caught fish. However, due to the complex nature of acoustic backscattering from fish, the spread in the target strength data is often wider than the spread in the measured fish length data (Burczynski and Johnson 1983, Burczynski et al. 1983).

Side-Aspect Target Strength at Mission Bridge

The relationship described above is for dorsally oriented fish. Aspect has a strong influence on measured target strengths. For the 1986 Mission Bridge study, data was collected at near aide-aspect orientations relative to the fish. Assuming that the sockeye were generally oriented with the current and parallel to the surface, the axis of the transducer beam intersected the fish at an angle of 80° to 85° from vertical (0° - straight down, i.e. dorsal aspect and 90° = horizontal, i.e. side-aspect). In addition the transducer was angled 30° upstream, shifting the axis of the beam in the horizontal plane 30° back from the broadside aspect, toward the posterior of an upstream migrant. The target strength of a salmonid of a given size is generally greatest at full side-aspect and decreases as one moves toward a head or tail aspect. The method used below to estimate mean sockeye target strength based on predicted fish aspect is similar to that used on the Susitna River in 1986 (Ransom et al. 1986).

To determine the effect of side-aspect aiming angles research by Dahl (1982) and Haslett (1977) was referenced. Sockeye catch data from the Georgia Strait collected just prior to the Mission Bridge study (Ransom and Burczynski, 1986) found that fish length varied between 44 cm and 62 cm, corresponding to a dorsal-aspect target strength of -30 dB to -33 dB (Love, 1971). Measurements of anesthetized salmonids in this size range have found side-aspect mean target strength to be between -26 dB and -24 dB, an increase of about 6 dB (Dahl 1982). This data is presented in Table B1 and Figures B2 and B3.

Dahl (1982) was also relied on for information on the effect of the horizontal aiming angle (angle upstream) on sockeye target strength. The profile of a salmonid, in an acoustic beam decreases greatly as it approaches a head-on or tail-on aspect, as does its target strength. At a 30° upstream aiming angle, side-aspect target strength of 40 cm to 61 cm salmonids was found to decrease a mean of about 9 dB over that measured at 0° (Table B2 and Figure B2). The observed target strengths varied between -32.0 dB and -37.7 dB, with a mean target strength of -34.2 dB. These values were assumed to represent the range of target strengths returned by sockeye to the single-beam system at Mission Bridge and were used for system calibration and beam-width calculations. They are approximately 2 dB and 4 dB below what would be predicted for fish of these lengths at dorsal-aspects using Love's equation (1971).

Off Angle Dorsal Target Strength Compensation

For the tracked dual-beam data, the fish were at different, near-dorsal aspects to the transducer. In order for directional information to be derived from NTRACKER, a BioSonica program which tracks and assembles fish detected on a dual-beam acoustic system, the data must be collected at a non-perpendicular dorsal or aide-aspect to the fish. Dual-beam data at Mission Bridge was collected at both 0° (straight down) and at an angle of 20° upstream in order to estimate mean dorsal target strength as well as a distribution of fish target strengths for scaling. The angle at which a salmonid is ensonified dorsally also has

Table B1. Length and weight of salmonid targets, with corresponding mean and maximum observed side aspect target strengths (Dahl 1982).

Fish	Length (cm)	Weight (kg)	Mean TS[1] (dB)	Max. observed TS[2] (dB)
1	40	0.65	-26.6	-18
2	52	1.92	-25.0	-17
3	55	2.33	-25.9	-17
4	56	2.64	-24.7	-17
5	57	2.62	-23.6	-17
6	61	3.10	-24.0	-17

[1] Mean side aspect target strength from the 10° sector of maximal target strength as determined from polar plots.

[2] Precision of polar plot scale is 1 dB

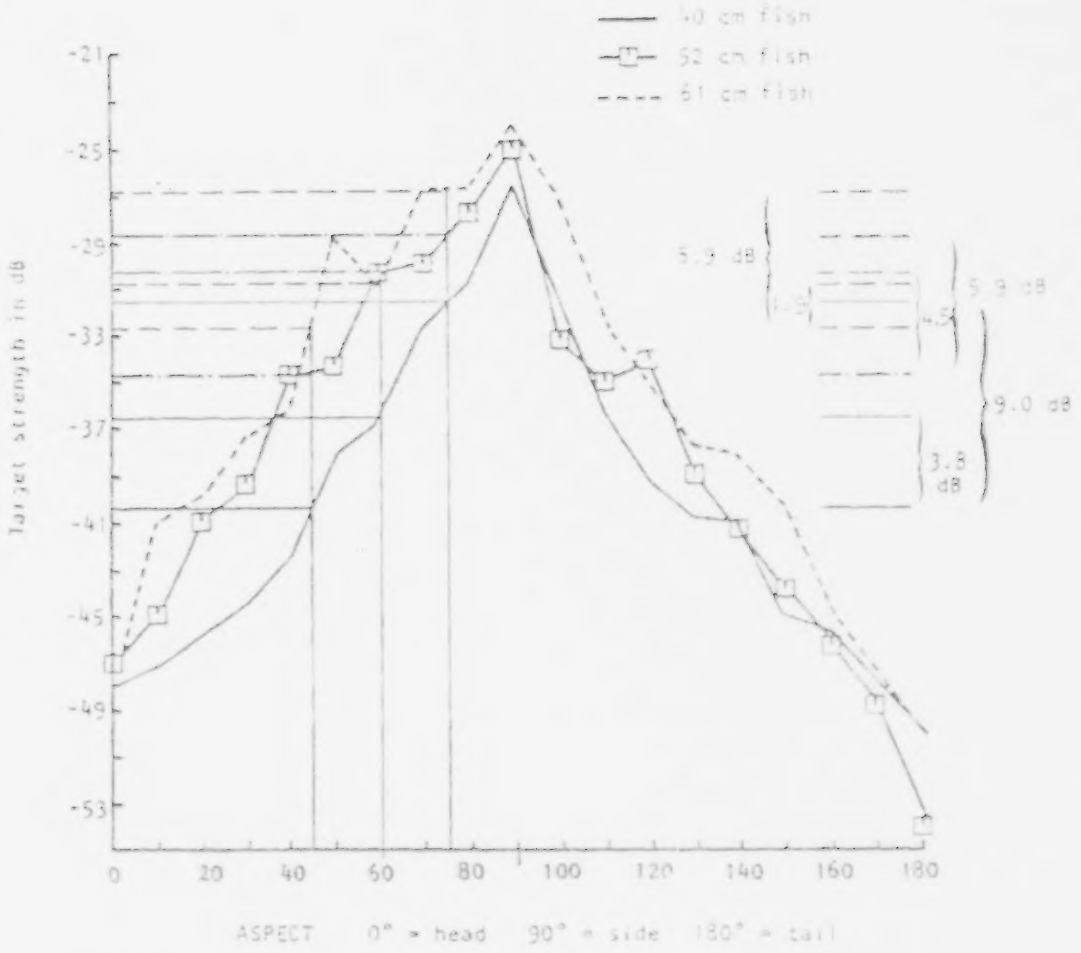

Figure 32. Plot of mean smoothed fish directivity (mean target strength in 10° increments (Dahl 1982).

Table B2. Mean target strengths of salmonid targets at 3 side-aspects (from Dahl 1982).

Fish Length (cm)	Predicted Dorsal TS (Love 1971)	Side-Aspect Aiming Angle 0°	30°*	330°**	Mean TS	Difference from 0°	Difference from Predicted Dorsal TS
40	-33.8	-26.6	-36.6	-38.8	-37.7	-11.1	-3.9
52	-31.6	-25.0	-30.2	-33.8	-32.0	-7.0	-0.4
61	-30.3	-24.0	-30.6	-35.0	-32.8	-8.8	-2.5
					Mean	-9.0	-2.3

* 30° toward head

** 30° toward tail

an effect on its target strength. Haslett (1969) and Acker (1977) have shown that the aspect of a fish in this plane can vary the observed target strength 20 dB or more. Haslett (1969) determined the mean target strength of a 74 cm fish at full dorsal-aspect to be 5 to 12 dB greater than when the fish was at an approximate 20° anterior or posterior dorsal-aspect to the axis of the acoustic beam, as was the case at Mission Bridge for the tracked dual-beam data. Based on his plots, 7 dB were subtracted from the range of expected dorsal-aspect sockeye target strengths. Assuming a mean dorsal-aspect target strength of -32 dB for sockeye salmon at Mission Bridge, and the approximately 3 dB of variability inherent in the tracked fish dual-beam data, the estimated range of target strengths for sockeye salmon at this aspect was -36 to -42 dB. This was the range used to calculate the percentage of sockeye in the population using the tracked dual-beam data from September 29 to October 1. It was assumed that the near side-aspect configuration of the single-beam acoustic systems at Mission Bridge decreased the lower threshold of those systems such that a -50 dB dorsal-aspect fish observed on the tracked dual-beam data could return a signal of -40 dB in side-aspect and be recorded by the single-beam system. For the angled dual-beam data, all targets above -50 dB were considered to constitute the population of fish in the river observed by the fixed-aspect system and the percentage of fish observed between -36 dB and -42 dB was used to estimate the percent sockeye in the population.

6.3 - Appendix C: Population summary tables.

Summary of fish populations in Williston Lake by sampling period and transect.

6.3.1 - Appendix C1 - June 1988

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 3 HALF ANGLE: 0

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	176	795	2584	176	2584	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	12006907	0
2				16	235	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	10735124	0
3				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
4				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
5				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				0.00	0.0000E+00	0		0.0000E+00		0

TRANSECT: 5 HALF ANGLE: 4.63

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	166	739	2402	166	2402	1.56	3.7360E+03	1	2.6761E-04	1.6303E-03	11013297	17955
2				161	2329	10.89	2.5370E+04	4	1.5767E-04	9.6051E-04	10520165	10105
3				157	2272	29.56	6.7150E+04	2	2.9784E-05	1.8144E-04	9980265	1811
4				0	0	57.57	0.0000E+00	0	0.0000E+00	0.0000E+00	5750245	0
5				0	0	94.91	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	141.59	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	197.60	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	262.94	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	337.63	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	421.64	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				1555.88	9.6257E+04	7		2.7722E-03		29870

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 9 HALF ANGLE: 4.43

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	93	417	1355	93	1355	1.42	1.9297E+03	1	5.1823E-04	3.1570E-03	6226593	19658
2				90	1312	9.97	1.3872E+04	4	3.0600E-04	1.8642E-03	6226593	11607
3				64	933	27.05	2.5231E+04	0	0.0000E+00	0.0000E+00	6226593	0
4				59	860	52.68	4.5295E+04	4	8.8310E-05	5.3798E-04	6226593	3350
5				56	816	86.85	7.0879E+04	0	0.0000E+00	0.0000E+00	2629097	0
6				0	0	129.57	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	180.83	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	240.63	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	308.97	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	385.86	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1423.84	1.5641E+05	9		5.5592E-03		34615

TRANSECT: 10 HALF ANGLE: 3.52

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	219	939	3052	213	2968	0.90	2.6643E+03	0	0.0000E+00	0.0000E+00	15286385	0
2				162	2257	6.28	1.4185E+04	0	0.0000E+00	0.0000E+00	15286385	0
3				157	2188	17.06	3.7313E+04	2	5.3631E-05	3.2654E-04	15286385	4992
4				51	711	33.21	2.3603E+04	0	0.0000E+00	0.0000E+00	15286385	0
5				26	362	54.76	1.9838E+04	0	0.0000E+00	0.0000E+00	15286385	0
6				0	0	81.68	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	114.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	151.70	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	194.79	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	243.26	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			897.63	9.7603E+04	2		3.2654E-04		4992

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 16 HALF ANGLE: 4.83

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	439	1902	6182	439	6182	1.69	1.0471E+04	2	1.9101E-04	1.1636E-03	26401385	30722
2				439	6182	11.86	7.3294E+04	2	2.7287E-05	1.6623E-04	26401385	4389
3				434	6111	32.18	1.9667E+05	27	1.3728E-04	8.3633E-04	26401385	22080
4				422	5942	62.67	3.7241E+05	2	5.3705E-06	3.2717E-05	26401385	864
5				409	5759	103.33	5.9506E+05	0	0.0000E+00	0.0000E+00	26401385	0
6				381	5365	154.14	8.2694E+05	0	0.0000E+00	0.0000E+00	26401385	0
7				0	0	215.12	0.0000E+00	0	0.0000E+00	0.0000E+00	20677565	0
8				0	0	286.26	0.0000E+00	0	0.0000E+00	0.0000E+00	20677565	0
9				0	0	367.57	0.0000E+00	0	0.0000E+00	0.0000E+00	20677565	0
10				0	0	459.03	0.0000E+00	0	0.0000E+00	0.0000E+00	11051114	0
			TOTALS:			1693.85	2.0746E+06	33		2.1989E-03		58055

TRANSECT: 18 HALF ANGLE: 4.51

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	453	1942	6312	453	6312	1.48	9.3154E+03	2	2.1470E-04	1.3079E-03	28486093	37258
2				449	6256	10.33	6.4632E+04	10	1.5472E-04	9.4256E-04	28486093	26850
3				394	5489	28.04	1.5394E+05	60	3.8976E-04	2.3744E-03	28486093	67638
4				371	5169	54.61	2.8228E+05	3	1.0628E-05	6.4744E-05	28486093	1844
5				370	5155	90.03	4.6413E+05	2	4.3092E-06	2.6251E-05	28486093	748
6				343	4779	134.31	6.4186E+05	0	0.0000E+00	0.0000E+00	28486093	0
7				335	4667	187.45	8.7489E+05	0	0.0000E+00	0.0000E+00	19133818	0
8				156	2173	249.43	5.4215E+05	1	1.8445E-06	1.1237E-05	19133818	215
9				0	0	320.28	0.0000E+00	0	0.0000E+00	0.0000E+00	19133818	0
10				0	0	399.98	0.0000E+00	0	0.0000E+00	0.0000E+00	19133818	0
			TOTALS:			1475.94	3.0332E+06	78		4.7272E-03		134553

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 20 HALF ANGLE: 4.79

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	533	2384	7748	533	7748	1.67	1.2906E+04	0	0.0000E+00	0.0000E+00	31344133	0
2				521	7574	11.66	8.8311E+04	18	2.0382E-04	1.2417E-03	27175646	33744
3				506	7356	31.65	2.3280E+05	27	1.1598E-04	7.0654E-04	24519507	17324
4				504	7326	61.63	4.5156E+05	15	3.3218E-05	2.0237E-04	21135197	4277
5				492	7152	101.61	7.2673E+05	8	1.1008E-05	6.7062E-05	18032804	1209
6				437	6352	151.59	9.6295E+05	4	4.1539E-06	2.5306E-05	18032804	456
7				303	4405	211.55	9.3181E+05	1	1.0732E-06	6.5378E-06	18032804	118
8				139	2021	281.52	5.6883E+05	1	1.7580E-06	1.0710E-05	18032804	193
9				0	0	361.47	0.0000E+00	0	0.0000E+00	0.0000E+00	18032804	0
10				0	0	451.43	0.0000E+00	0	0.0000E+00	0.0000E+00	11858975	0
		TOTALS:				1665.78	3.9759E+06	74		2.2602E-03		57322

TRANSECT: 21 HALF ANGLE: 4.51

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	506	2452	7969	506	7969	1.48	1.1762E+04	0	0.0000E+00	0.0000E+00	47755469	0
2				498	7843	10.33	8.1031E+04	5	6.1705E-05	3.7591E-04	44115313	16583
3				224	3528	28.04	9.8929E+04	2	2.0216E-05	1.2316E-04	41422214	5102
4				206	3244	54.61	1.7717E+05	2	1.1289E-05	6.8770E-05	39101380	2689
5				204	3213	90.03	2.8926E+05	0	0.0000E+00	0.0000E+00	19042762	0
6				154	2425	134.31	3.2575E+05	0	0.0000E+00	0.0000E+00	19042762	0
7				137	2158	187.45	4.0443E+05	0	0.0000E+00	0.0000E+00	16922145	0
8				0	0	249.43	0.0000E+00	0	0.0000E+00	0.0000E+00	16922145	0
9				0	0	320.28	0.0000E+00	0	0.0000E+00	0.0000E+00	16922145	0
10				0	0	399.98	0.0000E+00	0	0.0000E+00	0.0000E+00	13146341	0
		TOTALS:				1475.94	1.3883E+06	9		5.6783E-04		24374

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 22 HALF ANGLE: 4.85

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	485	2400	7800	485	7800	1.71	1.3322E+04	4	3.0025E-04	1.8291E-03	59908711	109580
2				485	7800	11.96	9.3256E+04	14	1.5013E-04	9.1456E-04	53292050	48739
3				485	7800	32.45	2.5312E+05	22	8.6915E-05	5.2948E-04	47403726	25099
4				476	7655	63.20	4.8378E+05	23	4.7543E-05	2.8963E-04	44875490	12997
5				470	7559	104.19	7.8752E+05	7	8.8886E-06	5.4150E-05	41586929	2252
6				466	7494	155.43	1.1648E+06	2	1.7170E-06	1.0460E-05	41586929	435
7				432	6948	216.91	1.5070E+06	0	0.0000E+00	0.0000E+00	38643887	0
8				427	6867	288.65	1.9822E+06	0	0.0000E+00	0.0000E+00	38643887	0
9				425	6835	370.63	2.5333E+06	0	0.0000E+00	0.0000E+00	38643887	0
10				0	0	462.86	0.0000E+00	0	0.0000E+00	0.0000E+00	34025831	0
			TOTALS:			1707.98	8.8184E+06	72		3.6274E-03		199103

TRANSECT: 47 HALF ANGLE: 4.77

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	558	2504	8138	558	8138	1.65	1.3443E+04	10	7.4390E-04	4.5318E-03	28026072	90755
2				558	8138	11.56	9.4099E+04	20	2.1254E-04	1.2948E-03	19666436	25464
3				552	8050	31.38	2.5266E+05	13	5.1452E-05	3.1344E-04	19074381	5979
4				460	6709	61.12	4.1003E+05	10	2.4389E-05	1.4858E-04	17415351	2588
5				426	6213	100.76	6.2603E+05	0	0.0000E+00	0.0000E+00	16600609	0
6				289	4215	150.32	6.3356E+05	0	0.0000E+00	0.0000E+00	16600609	0
7				0	0	209.78	0.0000E+00	0	0.0000E+00	0.0000E+00	16365524	0
8				0	0	279.16	0.0000E+00	0	0.0000E+00	0.0000E+00	16365524	0
9				0	0	358.45	0.0000E+00	0	0.0000E+00	0.0000E+00	16365524	0
10				0	0	447.65	0.0000E+00	0	0.0000E+00	0.0000E+00	8741739	0
			TOTALS:			1651.84	2.3279E+06	53		6.2867E-03		124786

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT:25A HALF ANGLE: 5.92

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	518	2293	7452	518	7452	3.99	2.9701E+04	1	3.3669E-05	2.0511E-04	47276379	9697
2				515	7409	27.90	2.0670E+05	40	1.9351E-04	1.1789E-03	45678757	53850
3				464	6675	75.72	5.0549E+05	14	2.7696E-05	1.6872E-04	44383418	7489
4				447	6431	147.46	9.4831E+05	1	1.0545E-06	6.4241E-06	42093867	270
5				162	2331	243.12	5.6661E+05	0	0.0000E+00	0.0000E+00	39736189	0
6				114	1640	362.68	5.9482E+05	0	0.0000E+00	0.0000E+00	37274512	0
7				48	691	506.16	3.4953E+05	0	0.0000E+00	0.0000E+00	34654569	0
8				20	288	673.55	1.9380E+05	0	0.0000E+00	0.0000E+00	31101309	0
9				0	0	864.85	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1080.07	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				3985.50	3.3958E+06	56		1.5592E-03		71306

TRANSECT:25B HALF ANGLE: 5.92

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	1372	5934	19286	1340	18836	3.99	7.5070E+04	11	1.4653E-04	8.9266E-04	47276379	42202
2				1322	18583	27.90	5.1813E+05	61	1.1766E-04	7.1680E-04	45678757	32743
3				1260	17711	75.72	1.3412E+06	69	5.1448E-05	3.1342E-04	44383418	13911
4				1235	17360	147.46	2.5599E+06	7	2.7344E-06	1.6658E-05	42093867	701
5				1055	14830	243.12	3.6053E+06	0	0.0000E+00	0.0000E+00	39736189	0
6				227	3191	362.68	1.1572E+06	0	0.0000E+00	0.0000E+00	37274512	0
7				107	1504	506.16	7.6128E+05	0	0.0000E+00	0.0000E+00	34654569	0
8				70	984	673.55	6.6274E+05	0	0.0000E+00	0.0000E+00	31101309	0
9				65	914	864.85	7.9019E+05	0	0.0000E+00	0.0000E+00	0	0
10				20	281	1080.07	3.0364E+05	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				3985.50	1.1775E+07	148		1.9395E-03		89557

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 28 HALF ANGLE: 5.58

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	836	3638	11824	766	10833	3.54	3.8329E+04	5	1.3045E-04	7.9469E-04	36425179	28947
2				128	1810	24.77	4.4834E+04	3	6.6913E-05	4.0764E-04	19718491	8038
3				100	1414	67.22	9.5072E+04	0	0.0000E+00	0.0000E+00	14115818	0
4				80	1131	130.91	1.4811E+05	0	0.0000E+00	0.0000E+00	11972346	0
5				75	1061	215.82	2.2892E+05	8	3.4946E-05	2.1289E-04	9677965	2060
6				52	735	321.96	2.3678E+05	0	0.0000E+00	0.0000E+00	5774811	0
7				40	566	449.33	2.5419E+05	0	0.0000E+00	0.0000E+00	1794490	0
8				25	354	597.93	2.1141E+05	0	0.0000E+00	0.0000E+00	1066203	0
9				18	255	767.75	1.9545E+05	0	0.0000E+00	0.0000E+00	0	0
10				8	113	958.81	1.0848E+05	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				3538.03	1.5616E+06	16		1.4152E-03		39045

TRANSECT: 32 HALF ANGLE: 6.85

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	630	2940	9555	600	9100	5.45	4.8676E+04	10	2.0544E-04	1.2515E-03	28813181	36086
2				250	3792	37.44	1.4197E+05	7	4.9306E-05	3.0037E-04	17702089	5317
3				157	2381	101.63	2.4200E+05	16	6.6115E-05	4.0278E-04	11328163	4563
4				154	2336	197.91	4.6226E+05	61	1.3196E-04	8.0390E-04	9348151	7515
5				149	2260	326.29	7.3736E+05	4	5.4248E-06	3.3048E-05	8151996	269
6				140	2123	486.70	1.0336E+06	4	1.8701E-06	2.3577E-05	7967246	188
7				138	2093	679.33	1.4216E+06	0	0.0000E+00	0.0000E+00	7967246	0
8				29	440	903.98	3.9760E+05	0	0.0000E+00	0.0000E+00	3155175	0
9				10	152	1160.74	1.7605E+05	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1449.58	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				5349.02	4.6613E+06	102		2.9152E-03		53938

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 36 HALF ANGLE: 2.95

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	431	2060	6695	431	6695	0.98	6.5903E+03	11	1.6691E-03	1.0168E-02	19543180	198721
2				377	5856	6.89	4.0352E+04	13	3.2216E-04	1.9626E-03	15726402	30865
3				275	4272	18.70	7.9894E+04	7	8.7616E-05	5.3376E-04	14927056	7967
4				184	2858	36.42	1.0410E+05	2	1.9213E-05	1.1704E-04	13107667	1534
5				176	2734	60.05	1.6416E+05	0	0.0000E+00	0.0000E+00	11727483	0
6				115	1786	89.58	1.6002E+05	1	6.2493E-06	3.8071E-05	9719728	370
7				0	0	125.01	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	166.36	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	213.61	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	266.76	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			984.16	5.5511E+05	34		1.7828E-02		239458

TRANSECT: 40 HALF ANGLE: 5.3

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	331	1583	5145	331	5145	3.19	1.6411E+04	2	1.2187E-04	7.4242E-04	21028697	15612
2				325	5051	22.33	1.1280E+05	4	3.5462E-05	2.1604E-04	19543773	4222
3				148	2300	60.61	1.3942E+05	0	0.0000E+00	0.0000E+00	18246337	0
4				145	2254	118.03	2.6600E+05	0	0.0000E+00	0.0000E+00	16927015	0
5				55	855	194.58	1.6634E+05	0	0.0000E+00	0.0000E+00	11648314	0
6				0	0	298.28	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	405.12	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	519.09	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	692.20	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	864.46	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			3189.88	7.3097E+05	6		9.5816E-04		19844

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 43 HALF ANGLE: 6.48

STRATUM NUMBER	LENGTH (nm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	283	1411	4586	283	4586	4.78	2.1929E+04	1	4.5602E-05	2.7701E-04	21987073	6108
2				220	3565	33.47	1.1933E+05	2	1.6760E-05	1.0210E-04	20129607	2055
3				45	729	90.86	6.6251E+04	0	0.0000E+00	0.0000E+00	14090908	0
4				19	308	176.93	5.4473E+04	0	0.0000E+00	0.0000E+00	0	0
5				0	0	291.70	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	435.16	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	607.41	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	808.15	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	1037.68	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1295.91	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			4781.95	2.6198E+05	3		3.7991E-04		8163

TRANSECT: 44 HALF ANGLE: 6.5

STRATUM NUMBER	LENGTH (nm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	507	2297	7465	487	7171	4.81	3.4504E+04	1	2.8982E-05	1.7656E-04	29386288	5188
2				357	5257	33.68	1.7705E+05	2	1.1296E-05	6.8815E-05	26552744	1827
3				16	236	91.42	2.1538E+04	2	9.2857E-05	5.6569E-04	10491734	5935
4				5	74	178.04	1.3107E+04	0	0.0000E+00	0.0000E+00	0	0
5				0	0	293.52	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	437.87	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	611.09	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	813.19	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	1044.15	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1304.99	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			4811.77	2.4620E+05	5		8.1106E-04		12951

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 45 HALF ANGLE: 0

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	174	852	2769	852	13559	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	13784750	0
2				160	2546	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	7813267	0
3				5	80	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	412737	0
4				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
5				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				0.00	0.0000E+00	0		0.0000E+00		0

TRANSECT: 46 HALF ANGLE: 0

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	237	1147	3728	237	3728	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	13063651	0
2				110	1730	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	5227235	0
3				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
4				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
5				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	0.00	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				0.00	0.0000E+00	0		0.0000E+00		0

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 48 HALF ANGLE: 4.5

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	184	841	2733	184	2733	1.47	4.0162E+03	6	1.4940E-03	9.1012E-03	14886139	135481
2				184	2733	10.29	2.8113E+04	13	4.6241E-04	2.8170E-03	14886139	41935
3				179	2659	27.92	7.4234E+04	11	1.4818E-04	9.0271E-04	14886139	13438
4				163	2421	54.37	1.3164E+05	10	7.5965E-05	4.6278E-04	14886139	6889
5				156	2317	89.63	2.0771E+05	0	0.0000E+00	0.0000E+00	14231252	0
6				153	2273	133.71	3.0390E+05	0	0.0000E+00	0.0000E+00	14231252	0
7				139	2065	186.61	3.8531E+05	0	0.0000E+00	0.0000E+00	12137102	0
8				136	2020	248.33	5.0167E+05	0	0.0000E+00	0.0000E+00	12137102	0
9				0	0	318.86	0.0000E+00	0	0.0000E+00	0.0000E+00	12137102	0
10				0	0	398.20	0.0000E+00	0	0.0000E+00	0.0000E+00	8682394	0
			TOTALS:			1469.38	1.6306E+06	40		1.3284E-02		197743

TRANSECT: 49 HALF ANGLE: 4.77

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	229	1043	3390	229	3390	1.65	5.5993E+03	7	1.2502E-03	7.6159E-03	10986232	83670
2				229	3390	11.56	3.9105E+04	25	6.3783E-04	3.8857E-03	10986232	42689
3				229	3390	31.38	1.0619E+05	70	6.5798E-04	4.0084E-03	10920716	43774
4				225	3331	61.12	2.0356E+05	29	1.4247E-04	8.6791E-04	10920716	9478
5				219	3242	100.76	3.2664E+05	0	0.0000E+00	0.0000E+00	10920716	0
6				218	3227	150.32	4.8506E+05	0	0.0000E+00	0.0000E+00	10920716	0
7				211	3123	209.78	6.5522E+05	0	0.0000E+00	0.0000E+00	9066216	0
8				137	2028	279.16	5.6612E+05	0	0.0000E+00	0.0000E+00	9066216	0
9				0	0	358.45	0.0000E+00	0	0.0000E+00	0.0000E+00	9066216	0
10				0	0	447.65	0.0000E+00	0	0.0000E+00	0.0000E+00	8640283	0
			TOTALS:			1651.84	2.3878E+06	131		1.6378E-02		179612

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 50 HALF ANGLE: 4.72

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	108	505	1641	108	1641	1.62	2.6543E+03	0	0.0000E+00	0.0000E+00	8865835	0
2				108	1641	11.32	1.8580E+04	21	1.1302E-03	6.8855E-03	8865835	61045
3				108	1641	30.73	5.0431E+04	17	3.3709E-04	2.0536E-03	8865835	18207
4				99	1504	59.84	9.0024E+04	6	6.6649E-05	4.0602E-04	8865835	3600
5				88	1337	98.65	1.3193E+05	3	2.2740E-05	1.3853E-04	7791672	1079
6				87	1322	147.17	1.9457E+05	0	0.0000E+00	0.0000E+00	7791672	0
7				81	1231	205.39	2.5282E+05	0	0.0000E+00	0.0000E+00	6683708	0
8				68	1033	273.31	2.8244E+05	0	0.0000E+00	0.0000E+00	6683708	0
9				0	0	350.94	0.0000E+00	0	0.0000E+00	0.0000E+00	6683708	0
10				0	0	438.27	0.0000E+00	0	0.0000E+00	0.0000E+00	5877349	0
			TOTALS:			1617.23	1.0234E+06	47		9.4836E-03		83931

TRANSECT: 51 HALF ANGLE: 4.7

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	205	899	2922	205	2922	1.60	4.6850E+03	4	8.5379E-04	5.2013E-03	10356378	53866
2				205	2922	11.22	3.2795E+04	6	1.8295E-04	1.1146E-03	9942153	11081
3				199	2836	30.47	8.6410E+04	10	1.1573E-04	7.0501E-04	9814264	6919
4				188	2679	59.33	1.5897E+05	7	4.4033E-05	2.6825E-04	9311770	2498
5				157	2238	97.81	2.1887E+05	6	2.7414E-05	1.6700E-04	8809276	1471
6				154	2195	145.92	3.2027E+05	2	6.2447E-06	3.8043E-05	8809276	335
7				153	2181	203.64	4.4407E+05	0	0.0000E+00	0.0000E+00	7430032	0
8				149	2124	270.99	5.7548E+05	0	0.0000E+00	0.0000E+00	7430032	0
9				0	0	347.96	0.0000E+00	0	0.0000E+00	0.0000E+00	7430032	0
10				0	0	434.55	0.0000E+00	0	0.0000E+00	0.0000E+00	5971869	0
			TOTALS:			1603.49	1.8416E+06	35		7.4941E-03		76171

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 52 HALF ANGLE: 4.43

STRATUM NUMBER	LENGTH (nm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	135	597	1940	135	1940	1.42	2.7626E+03	1	3.6198E-04	2.2052E-03	5454198	12027
2				135	1940	9.97	1.9338E+04	1	5.1711E-05	3.1502E-04	4965966	1564
3				131	1883	27.05	5.0934E+04	12	2.3560E-04	1.4353E-03	452442	649
4				125	1797	52.68	9.4645E+04	5	5.2829E-05	3.2183E-04	4205413	1353
5				88	1265	86.85	1.09E5E+05	0	0.0000E+00	0.0000E+00	3902028	0
6				85	1222	129.57	1.5829E+05	0	0.0000E+00	0.0000E+00	3902028	0
7				76	1092	180.83	1.9752E+05	0	0.0000E+00	0.0000E+00	3062607	0
8				63	905	240.63	2.1788E+05	0	0.0000E+00	0.0000E+00	3062607	0
9				0	0	308.97	0.0000E+00	0	0.0000E+00	0.0000E+00	3062607	0
10				0	0	385.86	0.0000E+00	0	0.0000E+00	0.0000E+00	2386125	0
			TOTALS:			1423.84	8.5121E+05	19		4.2773E-03		15595

TRANSECT: 53 HALF ANGLE: 4.69

STRATUM NUMBER	LENGTH (nm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	218	968	3146	218	3146	1.60	5.0231E+03	1	1.9908E-04	1.2128E-03	11057001	13410
2				218	3146	11.18	3.5161E+04	22	6.2569E-04	3.8117E-03	10856538	41382
3				218	3146	30.34	9.5438E+04	4	4.1912E-05	2.5533E-04	10601667	2707
4				216	3117	59.08	1.8415E+05	12	6.5165E-05	3.9699E-04	10278984	4081
5				214	3088	97.40	3.0078E+05	4	1.3299E-05	8.1015E-05	9394029	761
6				211	3045	145.29	4.4242E+05	4	9.0412E-06	5.5079E-05	9394029	517
7				170	2453	202.77	4.9747E+05	0	0.0000E+00	0.0000E+00	8538483	0
8				152	2194	269.83	5.9189E+05	0	0.0000E+00	0.0000E+00	8538483	0
9				0	0	346.47	0.0000E+00	0	0.0000E+00	0.0000E+00	8538483	0
10				0	0	432.69	0.0000E+00	0	0.0000E+00	0.0000E+00	7219279	0
			TOTALS:			1596.65	2.1523E+06	47		5.8129E-03		62858

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 54 HALF ANGLE: 3.26

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	138	634	2061	138	2061	0.77	1.5859E+03	0	0.0000E+00	0.0000E+00	9503173	0
2				138	2061	5.39	1.1101E+04	2	1.8016E-04	1.0976E-03	9193474	10090
3				137	2046	14.62	2.9913E+04	14	4.6802E-04	2.8512E-03	9080265	25890
4				112	1672	28.48	4.7622E+04	7	1.4699E-04	8.9547E-04	9071645	8123
5				85	1269	46.95	5.9585E+04	5	8.3914E-05	5.1120E-04	7347420	3756
6				82	1224	70.04	8.5752E+04	4	4.6646E-05	2.8417E-04	7347420	2088
7				76	1135	97.75	1.1092E+05	0	0.0000E+00	0.0000E+00	6173157	0
8				75	1120	130.07	1.4566E+05	6	4.1192E-05	2.5094E-04	6173157	1549
9				55	821	167.01	1.3715E+05	0	0.0000E+00	0.0000E+00	6173157	0
10				48	717	208.58	1.4949E+05	0	0.0000E+00	0.0000E+00	5203489	0
			TOTALS:			769.65	7.7877E+05	38		5.8905E-03		51496

TRANSECT: 55 HALF ANGLE: 4.91

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	152	664	2158	152	2158	1.75	3.7780E+03	2	5.2938E-04	3.2250E-03	10997296	35486
2				152	2158	12.25	2.6446E+04	10	3.7813E-04	2.3035E-03	10227551	23560
3				152	2158	33.26	7.1782E+04	6	8.3586E-05	5.0920E-04	10036817	5111
4				151	2144	64.78	1.3887E+05	11	7.9212E-05	4.8256E-04	10036817	4843
5				149	2115	106.79	2.2591E+05	10	4.4265E-05	2.6966E-04	8738749	2357
6				146	2073	159.31	3.3023E+05	0	0.0000E+00	0.0000E+00	8738749	0
7				141	2002	222.34	4.4509E+05	0	0.0000E+00	0.0000E+00	8142039	0
8				136	1931	295.87	5.7128E+05	0	0.0000E+00	0.0000E+00	8142039	0
9				133	1888	379.93	7.1735E+05	0	0.0000E+00	0.0000E+00	8142039	0
10				123	1746	474.44	8.2851E+05	0	0.0000E+00	0.0000E+00	6642657	0
			TOTALS:			1750.71	3.3592E+06	39		6.7899E-03		71336

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 56 HALF ANGLE: 4.86

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	240	1085	3526	240	3526	1.72	6.0477E+03	1	1.6535E-04	1.0073E-03	12574064	12666
2				240	3526	12.01	4.2334E+04	6	1.4173E-04	8.6342E-04	11835854	10219
3				237	3482	32.59	1.1347E+05	24	2.1151E-04	1.2885E-03	10214738	13162
4				232	3409	63.46	2.1631E+05	5	2.3115E-05	1.4082E-04	9111890	1283
5				155	2277	104.62	2.3826E+05	3	1.2592E-05	7.6708E-05	8716585	669
6				152	2233	156.07	3.4855E+05	0	0.0000E+00	0.0000E+00	8716585	0
7				149	2189	217.81	4.7684E+05	0	0.0000E+00	0.0000E+00	7508914	0
8				144	2116	289.85	6.1324E+05	0	0.0000E+00	0.0000E+00	7508914	0
9				143	2101	372.17	7.8195E+05	0	0.0000E+00	0.0000E+00	7508914	0
10				138	2028	464.78	9.4239E+05	0	0.0000E+00	0.0000E+00	5809570	0
		TOTALS:				1715.06	3.7794E+06	39		3.3768E-03		37999

TRANSECT: 58 HALF ANGLE: 3.8

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	183	856	2782	183	2782	1.05	2.9115E+03	0	0.0000E+00	0.0000E+00	16069543	0
2				183	2782	7.33	2.0381E+04	3	1.4720E-04	8.9673E-04	14872896	13337
3				181	2752	19.88	5.4714E+04	7	1.2794E-04	7.7939E-04	14243614	11101
4				177	2691	38.72	1.0419E+05	6	5.7585E-05	3.5081E-04	13879865	4869
5				173	2630	63.84	1.6790E+05	1	5.9560E-06	3.6284E-05	13807497	501
6				170	2584	95.24	2.4613E+05	0	0.0000E+00	0.0000E+00	13807497	0
7				163	2478	132.91	3.2935E+05	0	0.0000E+00	0.0000E+00	12725589	0
8				159	2417	176.87	4.2752E+05	0	0.0000E+00	0.0000E+00	12725589	0
9				157	2387	227.10	5.4204E+05	0	0.0000E+00	0.0000E+00	12725589	0
10				0	0	283.62	0.0000E+00	0	0.0000E+00	0.0000E+00	12062498	0
		TOTALS:				1046.56	1.8951E+06	17		2.0632E-03		29809

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 60 HALF ANGLE: 4.82

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	187	869	2824	187	2824	1.69	4.7640E+03	5	1.0495E-03	6.3938E-03	14610074	93414
2				187	2824	11.81	3.3348E+04	2	5.9974E-05	3.6536E-04	14232375	5200
3				187	2824	32.05	9.0516E+04	6	6.6287E-05	4.0382E-04	13369434	5399
4				181	2734	62.41	1.7061E+05	1	5.8613E-06	3.5707E-05	12634660	451
5				163	2462	102.90	2.5331E+05	0	0.0000E+00	0.0000E+00	11946682	0
6				161	2432	153.50	3.7325E+05	0	0.0000E+00	0.0000E+00	11946682	0
7				155	2341	214.23	5.0149E+05	0	0.0000E+00	0.0000E+00	10973892	0
8				149	2250	285.07	6.4151E+05	0	0.0000E+00	0.0000E+00	10973892	0
9				141	2130	366.04	7.7948E+05	0	0.0000E+00	0.0000E+00	10973892	0
10				136	2054	457.13	9.3894E+05	0	0.0000E+00	0.0000E+00	8763796	0
			TOTALS:			1686.81	3.7872E+06	14		7.1987E-03		104464

TRANSECT: 62 HALF ANGLE: 4.82

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	292	1307	4248	292	4248	1.17	4.9769E+03	1	2.0093E-04	1.2241E-03	29104669	35626
2				292	4248	8.20	3.4838E+04	6	1.7222E-04	1.0492E-03	28941906	30366
3				292	4248	22.26	9.4561E+04	3	3.1726E-05	1.9327E-04	28235680	5457
4				289	4204	43.35	1.8225E+05	3	1.6461E-05	1.0028E-04	28118253	2820
5				283	4117	71.47	2.9423E+05	0	0.0000E+00	0.0000E+00	28012205	0
6				280	4073	106.62	4.3429E+05	0	0.0000E+00	0.0000E+00	28012205	0
7				271	3942	148.80	5.8661E+05	0	0.0000E+00	0.0000E+00	25633787	0
8				259	3768	198.01	7.4604E+05	0	0.0000E+00	0.0000E+00	25633787	0
9				226	3288	254.25	8.3588E+05	0	0.0000E+00	0.0000E+00	25633787	0
10				221	3215	317.52	1.0208E+06	0	0.0000E+00	0.0000E+00	23592667	0
			TOTALS:			1171.65	4.2345E+06	13		2.5668E-03		74268

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 64 HALF ANGLE: 4.71

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	341	1476	4797	341	4797	1.61	7.7249E+03	3	3.8836E-04	2.3659E-03	21116014	49958
2				341	4797	11.27	5.4074E+04	1	1.8493E-05	1.1266E-04	20724918	2335
3				338	4755	30.60	1.4548E+05	6	4.1242E-05	2.5125E-04	19817034	4979
4				316	4445	59.58	2.6487E+05	8	3.0204E-05	1.8400E-04	16006330	2945
5				304	4277	98.23	4.2009E+05	3	7.1414E-06	4.3505E-05	19242003	837
6				303	4262	146.54	6.2463E+05	0	0.0000E+00	0.0000E+00	19242003	0
7				290	4080	204.52	8.3433E+05	0	0.0000E+00	0.0000E+00	17948514	0
8				282	3967	272.15	1.0796E+06	0	0.0000E+00	0.0000E+00	17948514	0
9				271	3812	349.45	1.3322E+06	0	0.0000E+00	0.0000E+00	17948514	0
10				256	3601	436.41	1.5716E+06	0	0.0000E+00	0.0000E+00	16915376	0
		TOTALS:				1610.36	6.3346E+06	21		2.9573E-03		61054

TRANSECT: 66 HALF ANGLE: 3.84

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	403	1768	5746	403	5746	1.07	6.1412E+03	2	3.2567E-04	1.9840E-03	20689361	41047
2				403	5746	7.48	4.2988E+04	11	2.5588E-04	1.5588E-03	20255404	31575
3				403	5746	20.31	1.1668E+05	13	1.1141E-04	6.7873E-04	19610214	13310
4				399	5689	39.54	2.2497E+05	0	0.0000E+00	0.0000E+00	15902819	0
5				356	5076	65.20	3.3092E+05	0	0.0000E+00	0.0000E+00	19304588	0
6				351	5005	97.26	4.8674E+05	0	0.0000E+00	0.0000E+00	19304588	0
7				312	4449	135.73	6.0381E+05	0	0.0000E+00	0.0000E+00	17873513	0
8				307	4377	180.62	7.9063E+05	2	2.5296E-06	1.5411E-05	17873513	275
9				303	4320	231.92	1.0020E+06	0	0.0000E+00	0.0000E+00	17873513	0
10				300	4277	289.64	1.2389E+06	0	0.0000E+00	0.0000E+00	15889914	0
		TOTALS:				1068.77	4.8437E+06	28		4.2370E-03		86208

WILLISTON LAKE

DATE: July 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 68 HALF ANGLE: 4.65

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	477	2183	7095	477	7095	1.57	1.1135E+04	3	2.6943E-04	1.6414E-03	27449328	45055
2				477	7095	10.99	7.7942E+04	3	3.8490E-05	2.3448E-04	27094570	6353
3				472	7020	29.82	2.0934E+05	0	0.0000E+00	0.0000E+00	25938402	0
4				466	6931	58.07	4.0248E+05	0	0.0000E+00	0.0000E+00	25792717	0
5				462	6872	95.73	6.5785E+05	0	0.0000E+00	0.0000E+00	25652601	0
6				457	6797	142.82	9.7076E+05	6	6.1807E-06	3.7653E-05	25652601	966
7				451	6708	199.32	1.3370E+06	0	0.0000E+00	0.0000E+00	24971686	0
8				425	6321	265.23	1.6766E+06	0	0.0000E+00	0.0000E+00	24971686	0
9				419	6232	340.56	2.1224E+06	0	0.0000E+00	0.0000E+00	24971686	0
10				392	5830	425.31	2.4798E+06	0	0.0000E+00	0.0000E+00	23849513	0
			TOTALS:			1569.41	9.9453E+06	12		1.9135E-03		52374

TRANSECT: 69 HALF ANGLE: 4.68

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	433	1981	6438	433	6438	1.59	1.0236E+04	5	4.8849E-04	2.9759E-03	32292554	96099
2				433	6438	11.13	7.1649E+04	0	0.0000E+00	0.0000E+00	31424314	0
3				429	6379	30.21	1.9268E+05	2	1.0380E-05	6.3234E-05	29682719	1877
4				418	6215	58.82	3.6560E+05	0	0.0000E+00	0.0000E+00	28830678	0
5				410	6096	96.98	5.9121E+05	0	0.0000E+00	0.0000E+00	28156979	0
6				391	5814	144.67	8.4110E+05	0	0.0000E+00	0.0000E+00	28156979	0
7				346	5145	201.91	1.0387E+06	0	0.0000E+00	0.0000E+00	26608713	0
8				333	4951	268.68	1.3303E+06	1	7.5170E-07	4.5793E-06	26608713	122
9				316	4699	344.99	1.6210E+06	1	6.1692E-07	3.7583E-06	26608713	100
10				233	3464	430.84	1.4926E+06	0	0.0000E+00	0.0000E+00	24196899	0
			TOTALS:			1589.82	7.5551E+06	9		3.0174E-03		98198

6.3.2 - Appendix C2 - September 1988

WILLISTON LAKE

DATE: Sept. 1968
CONTOUR INTERVALS: 20 FEET

PROJECT: 10 HALF ANGLE: 4.41

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	221	1142	1712	224	1712	1.41	5.2368E+03	2	3.8191E-04	2.32e6E-03	15286385	35566
2				183	1032	9.88	2.9948E+04	19	6.3444E-04	3.8650E-03	15286385	59082
3				172	2850	26.81	7.6401E+04	28	2.6178E-04	1.5947E-03	15286385	24378
4				65	1077	52.21	5.6225E+04	11	1.9564E-04	1.1918E-03	15286385	18219
5				24	390	86.07	3.4226E+04	0	0.0000E+00	0.0000E+00	15286385	0
6				18	290	128.40	3.8294E+04	0	0.0000E+00	0.0000E+00	0	0
7				0	0	179.19	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	238.45	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	306.18	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	382.37	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1410.96	2.4013E+05	52		8.9782E-03		137244

PROJECT: 12 HALF ANGLE: 3.76

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	67	361	1180	67	1180	1.02	1.2007E+03	2	1.6546E-03	1.0080E-02	10043890	101241
2				67	1180	7.17	8.4612E+03	16	1.8910E-03	1.1520E-02	10043890	115704
3				52	916	19.47	1.7824E+04	10	5.6103E-04	3.4179E-03	10043890	34328
4				50	880	37.31	3.3116E+03	2	6.9924E-05	3.6506E-04	10043890	3667
5				49	863	62.50	5.3924E+04	0	0.0000E+00	0.0000E+00	10043890	0
6				34	599	91.24	5.5819E+04	0	0.0000E+00	0.0000E+00	10043890	0
7				26	458	130.12	5.9571E+04	0	0.0000E+00	0.0000E+00	2697965	0
8				22	387	171.15	6.7876E+04	0	0.0000E+00	0.0000E+00	0	0
9				0	0	222.33	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	277.66	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			2024.58	2.9726E+05	30		2.5343E-02		254940

WILLISTON LAKE

DATE: Sept. 1988
CURRENT INTERVALS: 20 FEET

TRANSECT: 13 HALF ANGLE: 4.61

STRATUM NUMBER	LENGTH (sec)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	183	1003	3276	183	3276	1.54	5.0529E+03	0	0.0000E+00	0.0000E+00	10122340	0
2				183	3276	10.80	3.5371E+04	15	4.2408E-04	2.5835E-03	10122340	26151
3				183	3276	29.31	9.6006E+04	7	7.2912E-05	4.4418E-04	10122340	4496
4				181	3240	57.07	1.8492E+05	0	0.0000E+00	0.0000E+00	10122340	0
5				179	3204	94.09	3.0149E+05	0	0.0000E+00	0.0000E+00	10122340	0
6				178	3186	140.36	4.4725E+05	0	0.0000E+00	0.0000E+00	10122340	0
7				85	1522	195.89	2.9807E+05	0	0.0000E+00	0.0000E+00	7436622	0
8				28	501	260.67	1.3066E+05	0	0.0000E+00	0.0000E+00	0	0
9				0	0	334.70	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	417.99	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1542.41	1.4939E+06	22		3.0277E-03		30647

TRANSECT: 14 HALF ANGLE: 4.74

STRATUM NUMBER	LENGTH (sec)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	244	1225	3981	244	3981	1.63	6.4935E+03	1	1.5400E-04	9.3816E-04	12156949	11405
2				244	3981	11.42	4.5455E+04	31	6.8200E-04	4.1547E-03	12156949	50509
3				244	3981	30.99	1.2338E+05	20	1.6210E-04	9.8754E-04	12156949	12005
4				210	3426	60.35	2.0678E+05	5	2.4180E-05	1.4730E-04	12156949	1791
5				198	3231	99.49	3.2143E+05	0	0.0000E+00	0.0000E+00	12156949	0
6				185	3019	148.42	4.4823E+05	0	0.0000E+00	0.0000E+00	12156949	0
7				165	2692	207.14	5.5767E+05	0	0.0000E+00	0.0000E+00	12156949	0
8				112	1827	275.64	5.0373E+05	0	0.0000E+00	0.0000E+00	0	0
9				39	636	353.93	2.2522E+05	0	0.0000E+00	0.0000E+00	0	0
10				0	0	442.01	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1631.03	2.4382E+06	57		6.2277E-03		75710

WILLISTON LAKE

DATE: Sept. 1988
CURTAIN INTERVAL: 20 FEET

TRANSECT: 15 HALF ANGLE: 4.95

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	PRISTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	224	1112	1014	224	1014	1.78	6.4311E+01	6	9.3297E-04	5.6836E-03	15812167	89871
2				224	1014	12.46	4.5019E+04	34	7.5526E-04	4.6010E-03	15812167	72753
3				224	1014	33.01	1.2219E+05	34	2.7825E-04	1.6951E-03	15812167	26804
4				222	1002	65.04	2.3503E+05	2	8.4809E-06	5.1665E-05	15812167	817
5				213	957	100.55	3.6179E+05	0	0.0000E+00	0.0000E+00	15812167	0
6				171	779	161.93	4.4676E+05	0	0.0000E+00	0.0000E+00	15812167	0
7				110	495	226.00	4.8140E+05	0	0.0000E+00	0.0000E+00	8554564	0
8				41	161	300.73	1.9833E+05	0	0.0000E+00	0.0000E+00	0	0
9				23	111	386.15	1.4329E+05	0	0.0000E+00	0.0000E+00	0	0
10				8	125	482.24	6.2214E+04	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				1779.49	2.8436E+06	76		1.2031E-02		190244

TRANSECT: 16 HALF ANGLE: 4.72

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	PRISTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	823	4156	7887	423	788	1.62	1.1112E+04	8	7.0597E-04	4.3008E-03	26401385	113546
2				418	6926	11.32	7.8106E+04	45	5.7608E-04	3.4973E-03	26401385	92334
3				395	5543	82.74	2.8136E+05	89	1.4266E-04	2.6967E-03	26401385	71197
4				357	5914	59.84	1.5386E+05	10	2.8260E-05	1.7210E-04	26401385	4545
5				357	5914	98.65	5.8339E+05	0	0.0000E+00	0.0000E+00	26401385	0
6				127	2104	147.17	1.0961E+05	0	0.0000E+00	0.0000E+00	26401385	0
7				108	1789	285.39	1.6744E+05	0	0.0000E+00	0.0000E+00	20677565	0
8				97	1607	273.31	4.1916E+05	0	0.0000E+00	0.0000E+00	20677565	0
9				74	1226	350.94	4.3019E+05	0	0.0000E+00	0.0000E+00	20677565	0
10				12	530	130.27	2.3232E+05	0	0.0000E+00	0.0000E+00	11051114	0
		TOTALS:				1517.23	5.0867E+06	152		1.0667E-02		281622

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 17 HALF ANGLE: 4.71

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	386	1884	6123	386	6123	1.61	9.8602E+03	0	0.0000E+00	0.0000E+00	30207340	0
2				383	6075	11.27	6.8485E+04	20	2.9203E-04	1.7791E-03	30207340	53741
3				371	5885	30.60	1.8006E+05	18	9.9965E-05	6.0898E-04	30207340	18396
4				360	5711	59.58	3.4025E+05	4	1.1756E-05	7.1617E-05	30207340	2163
5				354	5615	98.23	5.5161E+05	0	0.0000E+00	0.0000E+00	30207340	0
6				324	5140	146.54	7.5316E+05	0	0.0000E+00	0.0000E+00	30207340	0
7				224	3553	204.52	7.2669E+05	0	0.0000E+00	0.0000E+00	19711507	0
8				207	3284	272.15	8.9363E+05	0	0.0000E+00	0.0000E+00	19711507	0
9				200	3173	349.45	1.1086E+06	0	0.0000E+00	0.0000E+00	19711507	0
10				30	476	436.41	2.0768E+05	0	0.0000E+00	0.0000E+00	7004862	0
			TOTALS:			1610.36	4.8401E+06	42		2.4597E-03		74300

TRANSECT: 18 HALF ANGLE: 4.5

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	622	3247	10553	622	10553	1.47	1.5506E+04	4	2.5796E-04	1.5715E-03	28486093	44766
2				524	8890	10.29	9.1441E+04	87	9.5144E-04	5.7962E-03	28486093	165110
3				502	8517	27.92	2.3778E+05	97	4.0795E-04	2.4852E-03	28486093	70794
4				476	8076	54.37	4.3905E+05	7	1.5943E-05	9.7127E-05	28486093	2767
5				463	7855	89.63	7.0408E+05	0	0.0000E+00	0.0000E+00	28486093	0
6				456	7736	133.71	1.0345E+06	5	4.8334E-06	2.9445E-05	28486093	839
7				459	7787	186.61	1.4532E+06	1	6.8814E-07	4.1921E-06	19133818	80
8				244	4140	248.33	1.0280E+06	0	0.0000E+00	0.0000E+00	19133818	0
9				183	3105	318.86	9.8997E+05	0	0.0000E+00	0.0000E+00	19133818	0
10				76	1289	398.20	5.1344E+05	0	0.0000E+00	0.0000E+00	19133818	0
			TOTALS:			1469.38	6.5069E+06	201		9.9837E-03		284356

WILLISTON LAKE

DATE: Sept. 1988
CENTER INTERVALS: 20 FEET

TRANSECT: 19 HALF ANGLE: 4.74

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	494	2312	7514	494	7514	1.63	1.2256E+04	4	3.2638E-04	1.9883E-03	21577003	42902
2				414	6297	11.42	7.1896E+04	37	5.1463E-04	3.1351E-03	21577003	67647
3				399	6069	30.99	1.8808E+05	31	1.6483E-04	1.0041E-03	21577003	21666
4				387	5886	60.35	3.5524E+05	13	3.6595E-05	2.2294E-04	21577003	4810
5				387	5886	99.49	5.8566E+05	0	0.0000E+00	0.0000E+00	21577003	0
6				340	5172	148.42	7.6759E+05	0	0.0000E+00	0.0000E+00	21577003	0
7				333	5065	207.14	1.0492E+06	1	9.5312E-07	5.8064E-06	21577003	125
8				259	3940	275.64	1.0859E+06	0	0.0000E+00	0.0000E+00	21577003	0
9				230	3498	353.93	1.2382E+06	0	0.0000E+00	0.0000E+00	21577003	0
10				203	3088	442.01	1.3648E+06	0	0.0000E+00	0.0000E+00	15348603	0
			TOTALS:			1631.03	6.7188E+06	86		6.3563E-03		137151

TRANSECT: 21 HALF ANGLE: 4.81

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	970	4275	13894	970	13894	1.68	2.3329E+04	10	4.2848E-04	2.6103E-03	47755469	124655
2				877	12562	11.76	1.4771E+05	155	1.0494E-03	6.3928E-03	44115313	282021
3				473	6775	31.92	2.1623E+05	80	3.6998E-04	2.2539E-03	41422214	93361
4				446	6388	62.15	3.9784E+05	11	2.7705E-05	1.6878E-04	39101380	6599
5				440	6302	102.47	6.4578E+05	3	4.6455E-06	2.8301E-05	19042762	539
6				382	5472	152.86	8.3639E+05	0	0.0000E+00	0.0000E+00	19042762	0
7				247	3538	213.33	7.5475E+05	0	0.0000E+00	0.0000E+00	16922145	0
8				225	3223	283.88	9.1498E+05	0	0.0000E+00	0.0000E+00	16922145	0
9				168	2406	364.51	8.7714E+05	0	0.0000E+00	0.0000E+00	16922145	0
10				140	2005	455.22	9.1285E+05	0	0.0000E+00	0.0000E+00	13146341	0
			TOTALS:			1679.79	5.7261E+06	259		1.1454E-02		507175

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT:21A HALF ANGLE: 5

STRATUM NUMBER	LENGTH (m)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	854	4243	13790	854	13790	1.82	2.5040E+04	14	5.5912E-04	3.4061E-03	48248578	164341
2				854	13790	12.71	1.7528E+05	111	6.3328E-04	3.8580E-03	42643517	164517
3				854	13790	34.50	4.7575E+05	120	2.5223E-04	1.5366E-03	37726444	57971
4				812	13112	67.18	8.8090E+05	23	2.6110E-05	1.5906E-04	32839843	5224
5				810	13079	110.76	1.4487E+06	13	8.9735E-06	5.4666E-05	27966604	1529
6				567	9155	165.24	1.5128E+06	2	1.3220E-06	8.0537E-06	27966604	225
7				492	7944	230.61	1.8320E+06	3	1.6375E-06	9.9757E-06	22819172	228
8				437	7056	306.87	2.1654E+06	0	0.0000E+00	0.0000E+00	22819172	0
9				381	6152	394.03	2.4241E+06	0	0.0000E+00	0.0000E+00	22819172	0
10				260	4198	492.08	2.0659E+06	0	0.0000E+00	0.0000E+00	17882727	0
		TOTALS:				1815.81	1.3086E+07	286		9.0325E-03		394035

TRANSECT:21B HALF ANGLE: 5

STRATUM NUMBER	LENGTH (m)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	603	3045	9896	603	9896	1.82	1.7970E+04	9	5.0084E-04	3.0511E-03	48248578	147213
2				603	9896	12.71	1.2579E+05	53	4.2134E-04	2.5668E-03	42643517	109459
3				603	9896	34.50	3.4142E+05	59	1.7281E-04	1.0527E-03	37726444	39716
4				575	9437	67.18	6.3400E+05	6	9.4637E-06	5.7653E-05	32839843	1893
5				573	9404	110.76	1.0416E+06	3	2.8801E-06	1.7546E-05	27966604	491
6				564	9256	165.24	1.5295E+06	2	1.3076E-06	7.9661E-06	27966604	223
7				564	9256	230.61	2.1345E+06	1	4.6848E-07	2.8540E-06	22819172	65
8				530	8698	306.87	2.6692E+06	0	0.0000E+00	0.0000E+00	22819172	0
9				393	6450	394.03	2.5414E+06	0	0.0000E+00	0.0000E+00	22819172	0
10				312	5120	492.08	2.5197E+06	0	0.0000E+00	0.0000E+00	17882727	0
		TOTALS:				1815.81	1.3555E+07	133		6.7567E-03		299060

WILLISTON LAKE

DATE: Sept. 1988
STATION INTERVALS: 25 FEET

TRANSECT: 25 HALF ANGLE: 7.45

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	504	4241	11790	504	11790	6.34	8.7403E+04	17	1.9450E-04	1.1849E-03	47276379	56018
2				864	11790	44.37	6.1182E+05	60	9.8068E-05	5.9743E-04	45678757	27290
3				817	10857	120.43	1.5724E+06	33	2.0988E-05	1.2786E-04	44383418	5675
4				781	12183	234.51	2.8571E+06	9	3.1501E-06	1.9190E-05	42093867	808
5				566	8529	386.63	3.4136E+06	1	2.9294E-07	1.7846E-06	39736189	71
6				269	3120	576.78	1.7995E+06	0	0.0000E+00	0.0000E+00	37274512	0
7				77	1281	884.95	9.6687E+05	0	0.0000E+00	0.0000E+00	34654569	0
8				74	1154	1071.16	1.2365E+06	0	0.0000E+00	0.0000E+00	31101309	0
9				58	985	1175.39	1.2444E+06	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1717.66	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			6198.22	1.1790E+07	120		1.9312E-03		89862

TRANSECT: 30 HALF ANGLE: 6.61

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	332	1599	5197	332	5197	4.98	2.5867E+04	10	1.8660E-04	2.1552E-03	38655391	72198
2				744	1384	34.84	6.2174E+04	6	9.6504E-05	5.8793E-04	20528983	12069
3				84	1535	94.57	1.2435E+05	5	4.0210E-05	2.4496E-04	16285000	3989
4				82	1291	184.17	2.3610E+05	0	0.0000E+00	0.0000E+00	12895952	0
5				72	1127	303.63	3.4219E+05	5	1.4612E-05	8.9015E-05	10790344	961
6				68	1064	352.95	3.8212E+05	0	0.0000E+00	0.0000E+00	9922525	0
7				56	980	412.14	5.7352E+05	0	0.0000E+00	0.0000E+00	7479302	0
8				52	833	481.19	6.8469E+05	0	0.0000E+00	0.0000E+00	4335630	0
9				24	376	1300.11	4.8576E+05	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1388.98	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			6777.47	2.9374E+06	26		3.2770E-03		89217

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 32 HALF ANGLE: 6.58

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	291	1442	4687	291	4687	4.93	2.3114E+04	9	3.8938E-04	2.3721E-03	28833181	68395
2				279	4493	14.52	1.5512E+05	14	9.0250E-05	5.4980E-04	17702089	9733
3				247	3978	93.71	3.7276E+05	0	0.0000E+00	0.0000E+00	11328163	0
4				212	3414	182.48	6.2304E+05	7	1.1235E-05	6.8445E-05	9348151	640
5				210	3382	300.85	1.0175E+06	2	1.9656E-06	1.1975E-05	8151996	98
6				192	3092	448.81	1.3878E+06	0	0.0000E+00	0.0000E+00	7967246	0
7				171	2754	626.36	1.7250E+06	0	0.0000E+00	0.0000E+00	7967246	0
8				147	2367	833.51	1.9733E+06	0	0.0000E+00	0.0000E+00	3155175	0
9				41	660	1070.24	7.0668E+05	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1336.57	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			4932.00	7.9842E+06	32		3.0023E-03		78865

TRANSECT: 34 HALF ANGLE: 7.26

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	588	2643	8590	588	8590	6.02	5.1673E+04	67	1.2966E-03	7.8990E-03	19543188	154372
2				518	7672	42.11	3.2304E+05	41	1.2692E-04	7.7319E-04	15726402	12159
3				418	6191	114.30	7.0756E+05	93	1.3144E-04	8.0072E-04	14927056	11952
4				249	3688	222.58	8.2079E+05	8	9.7467E-06	5.9377E-05	13107667	778
5				180	2666	366.95	9.7822E+05	9	9.2004E-06	5.6049E-05	11727483	657
6				100	1481	547.42	8.1073E+05	0	0.0000E+00	0.0000E+00	9719728	0
7				0	0	763.98	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	1016.64	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	1305.39	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1648.21	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			6015.61	3.6920E+06	218		9.5884E-03		179920

WILLISTON LAKE

DATE: Sept. 1988
CHAIN INTERVALS: 25 FEET

TRANSECT: 17 HALF ANGLE: 7.27

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	OUT. PINGS	STRAT. LENGTH	STRAT. PINGS	PROSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	222	870	2854	222	2854	6.03	1.7213E+04	15	8.7141E-04	5.3087E-03	13103878	69564
2				210	2699	42.23	1.1398E+05	45	3.9480E-04	2.4051E-03	11164613	26853
3				194	2494	114.62	2.8580E+05	16	5.5982E-05	3.4104E-04	11058616	3771
4				180	2314	223.20	5.1640E+05	8	1.5492E-05	9.4376E-05	10216525	964
5				137	1375	367.97	5.8609E+05	0	0.0000E+00	0.0000E+00	9580011	0
6				85	1091	548.95	5.9975E+05	0	0.0000E+00	0.0000E+00	7706988	0
7				0	0	766.11	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	1019.47	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	1309.83	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1634.77	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			6032.38	2.0392E+06	84		8.1492E-03		101152

TRANSECT: 19 HALF ANGLE: 8.92

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	OUT. PINGS	STRAT. LENGTH	STRAT. PINGS	PROSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	384	950	3761	384	3761	9.11	2.5225E+04	48	1.9029E-03	1.1592E-02	13764325	159561
2				360	3526	63.92	1.7425E+05	35	2.0086E-04	1.2236E-03	11544091	14126
3				299	2917	178.49	4.7139E+05	27	5.7277E-05	3.4893E-04	10986702	3834
4				270	2526	337.85	8.5350E+05	12	1.4060E-05	8.5652E-05	9113743	781
5				201	1823	557.00	1.0174E+06	7	6.8804E-06	4.1916E-05	7875908	330
6				45	409	838.94	3.3979E+05	0	0.0000E+00	0.0000E+00	991602	0
7				0	0	1159.66	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	1543.17	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	1981.47	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	2474.55	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			9131.20	2.8815E+06	129		1.1292E-02		178631

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 40 HALF ANGLE: 5.6

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	313	1464	4758	313	4758	3.82	1.8197E+04	21	1.1540E-03	7.0305E-03	21028697	147842
2				313	4758	26.77	1.2738E+05	5	3.9253E-05	2.3913E-04	19543773	4674
3				130	1976	72.66	1.4360E+05	1	6.9639E-06	4.2424E-05	18246337	774
4				105	1596	141.51	2.2586E+05	0	0.0000E+00	0.0000E+00	16927015	0
5				83	1262	233.29	2.9435E+05	3	1.0192E-05	6.2090E-05	11648314	723
6				0	0	348.03	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	485.71	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	646.33	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	829.91	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1036.43	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			3824.46	8.0938E+05	30		7.3741E-03		154012

TRANSECT: 41 HALF ANGLE: 6.78

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	354	1740	5655	354	5655	5.24	2.9628E+04	15	5.0628E-04	3.0843E-03	25208515	77750
2				350	5591	36.67	2.0505E+05	20	9.7536E-05	5.9419E-04	23464840	13943
3				115	1837	99.55	1.8287E+05	6	3.2810E-05	1.9988E-04	22670419	4531
4				90	1438	193.85	2.7870E+05	2	7.1761E-06	4.3717E-05	15732804	688
5				54	863	319.59	2.7569E+05	0	0.0000E+00	0.0000E+00	6129535	0
6				0	0	476.77	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	665.38	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	885.43	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	1136.91	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1419.83	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			5239.23	9.7194E+05	43		3.9220E-03		96911

WILLISTON LAKE

DATE: Sept. 1988
CHECKED INTERVALS: 25 FEET

BOMBACK: 43 HALF ANGLE: 6.54

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	EST. FINGS	STRAT. LENGTH	STRAT. FINGS	PROTEIN VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	363	1772	5753	363	5753	4.87	2.8056E+04	16	5.7029E-04	3.4742E-03	21987073	76387
2				953	5609	34.10	1.3099E+05	16	8.3777E-05	5.1037E-04	20129607	10274
3				91	1441	92.56	1.3363E+05	4	2.9933E-05	1.8235E-04	14090908	2569
4				54	857	160.25	1.5442E+05	3	1.9427E-05	1.1835E-04	0	0
5				0	0	297.17	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	443.32	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	619.70	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	823.32	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	1057.16	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1320.23	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			4871.69	5.0710E+05	39		4.2853E-03		89230

WILLISTON LAKE

DATE: Sept. 1988
CENTER INTERVALS: 20 FEET

TRANSECT: 47A HALF ANGLE: 4.57

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	414	2194	7131	414	7131	1.52	1.0807E+04	8	7.4024E-04	4.5895E-03	20026072	90308
2				414	7131	10.61	7.5651E+04	68	8.9886E-04	5.4759E-03	19666436	107691
3				394	6786	28.80	1.9542E+05	43	2.2004E-04	1.3405E-03	19074381	25569
4				372	6407	56.08	3.5930E+05	8	2.2265E-05	1.3564E-04	17415351	2362
5				337	5804	92.45	5.3663E+05	0	0.0000E+00	0.0000E+00	16600609	0
6				288	4230	137.92	4.4660E+05	0	0.0000E+00	0.0000E+00	16600609	0
7				181	3117	192.49	6.0007E+05	0	0.0000E+00	0.0000E+00	16365524	0
8				165	2842	256.14	7.2793E+05	0	0.0000E+00	0.0000E+00	16365524	0
9				132	2273	328.90	7.4774E+05	0	0.0000E+00	0.0000E+00	16365524	0
10				59	1016	410.74	4.1739E+05	0	0.0000E+00	0.0000E+00	8741739	0
			TOTALS:			1515.65	4.1175E+06	127		1.1462E-02		225930

TRANSECT: 47B HALF ANGLE: 4.57

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	886	1979	6432	886	6432	1.52	9.7483E+03	14	1.4362E-03	8.7491E-03	20026072	175209
2				886	6432	10.61	6.8238E+04	237	3.4731E-03	2.1158E-02	19666436	416111
3				886	6432	28.80	1.8522E+05	291	1.5711E-03	9.5713E-03	19074381	182567
4				886	6432	56.08	3.6069E+05	22	6.0995E-05	3.7158E-04	17415351	6471
5				319	5854	92.45	4.6722E+05	2	4.2806E-06	2.6078E-05	16600609	433
6				172	2725	137.92	3.7581E+05	0	0.0000E+00	0.0000E+00	16600609	0
7				162	2566	192.49	4.9399E+05	0	0.0000E+00	0.0000E+00	16365524	0
8				156	2471	256.14	6.3301E+05	0	0.0000E+00	0.0000E+00	16365524	0
9				136	2154	328.90	7.0868E+05	0	0.0000E+00	0.0000E+00	16365524	0
10				73	1156	410.74	4.7500E+05	0	0.0000E+00	0.0000E+00	8741739	0
			TOTALS:			1515.65	3.7775E+06	566		3.9876E-02		780791

WILLISTON LAKE

DATE: Sept. 1988
COMPUTER INTERVALS: 20 FEET

TRANSECT: 88 HALF ANGLE: 4.64

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	PRISTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	266	1166	3790	266	3790	1.56	5.9216E+03	12	2.0265E-03	1.2345E-02	14886139	183774
2				266	3790	10.94	4.1451E+04	6	1.4475E-04	8.8181E-04	14886139	13127
3				266	3790	29.69	1.1251E+05	101	8.9769E-04	5.4687E-03	14886139	81408
4				242	3448	57.82	1.9933E+05	13	6.5218E-05	3.9731E-04	14886139	5914
5				225	3205	95.32	3.0554E+05	0	0.0000E+00	0.0000E+00	14231252	0
6				216	3077	142.20	4.3758E+05	0	0.0000E+00	0.0000E+00	14231252	0
7				189	2693	198.45	5.3415E+05	0	0.0000E+00	0.0000E+00	12137102	0
8				175	2493	264.09	6.5839E+05	0	0.0000E+00	0.0000E+00	12137102	0
9				158	2251	339.09	7.6327E+05	0	0.0000E+00	0.0000E+00	12137102	0
10				145	2066	423.47	8.7477E+05	0	0.0000E+00	0.0000E+00	8682394	0
			TOTALS:			1562.64	3.9331E+06	132		1.9093E-02		284223

TRANSECT: 89 HALF ANGLE: 4.96

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	PRISTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	217	971	3156	217	3156	1.79	5.6385E+03	5	8.8677E-04	5.4022E-03	10986232	59350
2				217	3156	12.51	3.9469E+04	11	2.7870E-04	1.6978E-03	10986232	18653
3				213	3098	33.95	1.0516E+05	27	2.5676E-04	1.5642E-03	10920716	17082
4				212	3083	66.11	2.0382E+05	26	1.2757E-04	7.7713E-04	10920716	8487
5				205	2981	109.99	3.2493E+05	19	5.8475E-05	3.5623E-04	10920716	3890
6				204	2967	162.59	4.8236E+05	3	6.2194E-06	3.7889E-05	10920716	414
7				203	2952	226.91	6.6938E+05	0	0.0000E+00	0.0000E+00	9066216	0
8				0	0	301.96	0.0000E+00	0	0.0000E+00	0.0000E+00	9066216	0
9				0	0	387.72	0.0000E+00	0	0.0000E+00	0.0000E+00	9066216	0
10				0	0	484.20	0.0000E+00	0	0.0000E+00	0.0000E+00	8640283	0
			TOTALS:			1786.72	1.8313E+06	91		9.8355E-03		107875

WILLISTON LAKE

DATE: Sept. 1989
CARLSON PERIPHERALS 20 FEET

CONDUCTIVITY: 58 HALF ANGLE: 4.5

STRATUM OPENING	LENGTH (km)	FUNC (km²)	DIV. FISH	STRAT. LENGTH	STRAT. FISH	EMISSION VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	174	4.91	2259	154	2259	1.47	1.31 9E+01	1	1.81 58E-04	1.81 55E-01	8865835	16273
2				154	2259	58.29	2.32 15E+04	0	0.00 00E+00	0.00 00E+00	8865835	0
3				154	2259	27.92	6.58 06E+04	4	5.51 47E-05	5.79 48E-04	8865835	5139
4				145	1382	54.17	1.87 52E+05	0	0.00 00E+00	0.00 00E+00	8865835	0
5				189	1539	99.63	1.61 30E+05	1	6.19 70E-06	1.25 43E-05	7791672	131
6				189	1482	131.71	1.56 01E+05	0	0.00 00E+00	0.00 00E+00	7791672	0
7				94	1371	136.61	2.57 21E+05	0	0.00 00E+00	0.00 00E+00	6603704	0
8				94	1261	248.33	3.15 23E+05	0	0.00 00E+00	0.00 00E+00	6603704	0
9				94	1157	458.86	1.55 43E+05	0	0.00 00E+00	0.00 00E+00	6603704	0
10				94	740	198.29	2.97 67E+05	0	0.00 00E+00	0.00 00E+00	5877343	0
			BUSHELL			1869.38	1.76 27E+06	6		2.45 77E-05		21744

CONDUCTIVITY: 91 HALF ANGLE: 1.83

STRATUM OPENING	LENGTH (km)	FUNC (km²)	DIV. FISH	STRAT. LENGTH	STRAT. FISH	EMISSION VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	283	11.20	3441	283	3441	0.05	3.14 26E+03	1	1.21 36E-04	1.96 13E-03	18356178	22313
2				283	3441	5.91	2.17 23E+04	1	1.59 18E-05	2.68 26E-04	9982153	2796
3				283	3441	14.58	5.10 18E+04	0	0.00 00E+00	0.00 00E+00	9982154	0
4				243	3157	31.31	1.01 56E+05	5	1.51 75E-05	2.76 41E-04	9911778	2738
5				192	2781	53.58	1.31 98E+05	0	0.00 00E+00	0.00 00E+00	8689276	0
6				176	2481	77.19	2.27 91E+05	0	0.00 00E+00	0.00 00E+00	8689276	0
7				177	2135	187.68	2.17 52E+05	0	0.00 00E+00	0.00 00E+00	7458852	0
8				167	1531	143.19	1.68 10E+05	0	0.00 00E+00	0.00 00E+00	7458852	0
9				0	0	131.05	0.00 00E+00	0	0.00 00E+00	0.00 00E+00	7458852	0
10				0	0	229.68	0.00 00E+00	0	0.00 00E+00	0.00 00E+00	5971864	0
			BUSHELL			887.18	1.19 11E+06	7		2.51 68E-03		27847

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 52 HALF ANGLE: 3.34

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	123	625	2031	123	2031	0.81	1.6412E+03	1	6.0931E-04	3.7119E-03	5454198	20246
2				123	2031	5.66	1.1488E+04	0	0.0000E+00	0.0000E+00	4965966	0
3				118	1949	15.35	2.9915E+04	2	6.6856E-05	4.0728E-04	4588719	1869
4				56	925	29.90	2.7647E+04	0	0.0000E+00	0.0000E+00	4205413	0
5				55	908	49.29	4.4766E+04	4	8.9353E-05	5.4434E-04	3902028	2124
6				50	826	73.53	6.0711E+04	0	0.0000E+00	0.0000E+00	3902028	0
7				47	776	102.61	7.9645E+04	0	0.0000E+00	0.0000E+00	3062607	0
8				45	743	136.55	1.0147E+05	0	0.0000E+00	0.0000E+00	3062607	0
9				37	611	175.33	1.0713E+05	0	0.0000E+00	0.0000E+00	3062607	0
10				0	0	218.96	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			807.98	4.6442E+05	7		4.6635E-03		24238

TRANSECT: 56 HALF ANGLE: 4.24

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	180	806	2620	180	2620	1.30	3.4155E+03	2	5.8556E-04	3.5672E-03	12574064	44855
2				180	2620	9.13	2.3909E+04	0	0.0000E+00	0.0000E+00	11835854	0
3				180	2620	24.77	6.4805E+04	2	3.0819E-05	1.8775E-04	10214738	1918
4				174	2532	48.24	1.2216E+05	0	0.0000E+00	0.0000E+00	9111890	0
5				173	2518	79.54	2.0025E+05	0	0.0000E+00	0.0000E+00	8716585	0
6				162	2358	118.65	2.7973E+05	0	0.0000E+00	0.0000E+00	8716585	0
7				156	2270	165.59	3.7594E+05	0	0.0000E+00	0.0000E+00	7508914	0
8				151	2197	220.36	4.8423E+05	0	0.0000E+00	0.0000E+00	7508914	0
9				132	1921	282.94	5.4352E+05	0	0.0000E+00	0.0000E+00	7508914	0
10				104	1513	353.35	5.3480E+05	0	0.0000E+00	0.0000E+00	5809570	0
			TOTALS:			1303.89	2.6328E+06	4		3.7550E-03		46772

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 53 HALF ANGLE: 4.24

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	294	1313	4267	294	4267	1.30	5.5640E+03	3	5.3918E-04	3.2847E-03	11057001	36319
2				294	4267	9.13	3.8948E+04	3	7.7026E-05	4.6924E-04	10856538	5094
3				294	4267	24.77	1.0572E+05	6	5.6756E-05	3.4576E-04	10601667	3666
4				294	4267	48.24	2.0587E+05	0	0.0000E+00	0.0000E+00	10278984	0
5				284	4122	79.54	3.2736E+05	0	0.0000E+00	0.0000E+00	9394029	0
6				284	4122	118.65	4.8910E+05	0	0.0000E+00	0.0000E+00	9394029	0
7				0	0	165.59	0.0000E+00	0	0.0000E+00	0.0000E+00	8538483	0
8				0	0	220.36	0.0000E+00	0	0.0000E+00	0.0000E+00	8538483	0
9				0	0	282.94	0.0000E+00	0	0.0000E+00	0.0000E+00	8538483	0
10				0	0	353.35	0.0000E+00	0	0.0000E+00	0.0000E+00	7219279	0
		TOTALS:				1303.89	1.1731E+06	12		4.0997E-03		45079

TRANSECT: 54 HALF ANGLE: 3.14

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	134	620	2015	134	2015	0.71	1.4386E+03	0	0.0000E+00	0.0000E+00	9503173	0
2				134	2015	5.00	1.0070E+04	0	0.0000E+00	0.0000E+00	9193474	0
3				134	2015	13.56	2.7332E+04	6	2.1952E-04	1.3373E-03	9080265	12143
4				122	1835	26.42	4.8460E+04	0	0.0000E+00	0.0000E+00	9071645	0
5				95	1429	43.55	6.2212E+04	1	1.6074E-05	9.7923E-05	7347420	719
6				91	1368	64.97	8.8900E+04	0	0.0000E+00	0.0000E+00	7347420	0
7				86	1293	90.67	1.1725E+05	0	0.0000E+00	0.0000E+00	6173157	0
8				0	0	120.65	0.0000E+00	0	0.0000E+00	0.0000E+00	6173157	0
9				0	0	154.92	0.0000E+00	0	0.0000E+00	0.0000E+00	6173157	0
10				0	0	193.47	0.0000E+00	0	0.0000E+00	0.0000E+00	5203489	0
		TOTALS:				713.92	3.5567E+05	7		1.4352E-03		12863

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 55 HALF ANGLE: 4.79

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	213	977	3175	213	3175	1.67	5.2893E+03	4	7.5625E-04	1.6071E-03	10997296	50665
2				213	3175	11.66	3.7025E+04	7	1.8906E-04	1.1518E-03	10227551	11780
3				213	3175	31.65	1.0050E+05	12	1.1941E-04	7.2743E-04	10036817	7301
4				213	3175	61.63	1.9570E+05	2	1.0220E-05	6.2258E-05	10036817	625
5				210	3131	101.61	3.1810E+05	0	0.0000E+00	0.0000E+00	8738749	0
6				207	3086	151.59	4.6777E+05	0	0.0000E+00	0.0000E+00	8738749	0
7				204	3041	211.55	6.4336E+05	0	0.0000E+00	0.0000E+00	8142039	0
8				0	0	281.52	0.0000E+00	0	0.0000E+00	0.0000E+00	8142039	0
9				0	0	361.47	0.0000E+00	0	0.0000E+00	0.0000E+00	8142039	0
10				0	0	451.43	0.0000E+00	0	0.0000E+00	0.0000E+00	6642657	0
			TOTALS:			1665.78	1.7677E+06	25		6.5485E-03		70371

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 60 HALF ANGLE: 4.9

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	184	813	2642	184	2642	1.74	4.6069E+03	5	1.0853E-03	6.6118E-03	14610074	96599
2				184	2642	12.20	3.2248E+04	15	4.6514E-04	2.8336E-03	14232375	40329
3				184	2642	33.13	8.7531E+04	2	2.2849E-05	1.3920E-04	13369434	1861
4				183	2628	64.51	1.6953E+05	1	5.8987E-06	3.5935E-05	12634660	454
5				175	2513	106.36	2.6727E+05	5	1.8707E-05	1.1397E-04	11946682	1362
6				161	2312	158.66	3.6682E+05	7	1.9083E-05	1.1625E-04	11946682	1389
7				154	2211	221.43	4.8968E+05	0	0.0000E+00	0.0000E+00	10973892	0
8				153	2197	294.66	6.4739E+05	0	0.0000E+00	0.0000E+00	10973892	0
9				0	0	378.35	0.0000E+00	0	0.0000E+00	0.0000E+00	10973892	0
10				0	0	472.50	0.0000E+00	0	0.0000E+00	0.0000E+00	8763796	0
			TOTALS:			1743.55	2.0651E+06	35		9.8508E-03		141994

TRANSECT: 61 HALF ANGLE: 4.42

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	214	1620	5265	214	5265	1.42	7.4626E+03	23	3.0820E-03	1.8776E-02	16358515	307144
2				214	5265	9.92	5.2238E+04	17	3.2543E-04	1.9825E-03	16203514	32124
3				214	5265	26.93	1.4179E+05	0	0.0000E+00	0.0000E+00	15579840	0
4				214	5265	52.44	2.7612E+05	2	7.2433E-06	4.4126E-05	15027722	663
5				214	5265	86.46	4.5522E+05	0	0.0000E+00	0.0000E+00	14606587	0
6				211	5191	128.98	6.6957E+05	0	0.0000E+00	0.0000E+00	14606587	0
7				0	0	180.01	0.0000E+00	0	0.0000E+00	0.0000E+00	11605162	0
8				0	0	239.54	0.0000E+00	0	0.0000E+00	0.0000E+00	11605162	0
9				0	0	307.57	0.0000E+00	0	0.0000E+00	0.0000E+00	11605162	0
10				0	0	384.11	0.0000E+00	0	0.0000E+00	0.0000E+00	9554665	0
			TOTALS:			1417.39	1.6024E+06	42		2.0802E-02		339932

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 63 HALF ANGLE: 5

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	435	1940	6305	435	6305	1.82	1.1449E+04	7	6.1143E-04	3.7248E-03	22562665	84042
2				435	6305	12.71	8.0141E+04	18	2.2461E-04	1.3683E-03	22394532	30642
3				435	6305	34.50	2.1752E+05	0	0.0000E+00	0.0000E+00	21559021	0
4				435	6305	67.18	4.2360E+05	0	0.0000E+00	0.0000E+00	21260684	0
5				434	6291	110.76	6.9676E+05	0	0.0000E+00	0.0000E+00	21227605	0
6				0	0	165.24	0.0000E+00	0	0.0000E+00	0.0000E+00	21227605	0
7				0	0	230.61	0.0000E+00	0	0.0000E+00	0.0000E+00	20513413	0
8				0	0	306.87	0.0000E+00	0	0.0000E+00	0.0000E+00	20513413	0
9				0	0	394.03	0.0000E+00	0	0.0000E+00	0.0000E+00	20513413	0
10				0	0	492.08	0.0000E+00	0	0.0000E+00	0.0000E+00	19920202	0
			TOTALS:			1815.81	1.4295E+06	25		5.0931E-03		114684

TRANSECT: 65 HALF ANGLE: 4.7

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	349	1577	5125	349	5125	1.60	8.2183E+03	3	3.6504E-04	2.2238E-03	21766176	48404
2				349	5125	11.22	5.7528E+04	3	5.2148E-05	3.1769E-04	21258170	6753
3				349	5125	30.47	1.5615E+05	12	7.6850E-05	4.6817E-04	20670432	9677
4				344	5052	59.33	2.9972E+05	3	1.0009E-05	6.0977E-05	20337791	1240
5				342	5022	97.81	4.9126E+05	0	0.0000E+00	0.0000E+00	20137886	0
6				0	0	145.92	0.0000E+00	0	0.0000E+00	0.0000E+00	20137886	0
7				0	0	203.64	0.0000E+00	0	0.0000E+00	0.0000E+00	19400671	0
8				0	0	270.99	0.0000E+00	0	0.0000E+00	0.0000E+00	19400671	0
9				0	0	347.96	0.0000E+00	0	0.0000E+00	0.0000E+00	19400671	0
10				0	0	434.55	0.0000E+00	0	0.0000E+00	0.0000E+00	18908982	0
			TOTALS:			1603.49	1.0129E+06	21		3.0706E-03		66075

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 67 HALF ANGLE: 4.79

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	437	2018	6559	437	6559	1.67	1.0925E+04	7	6.4073E-04	3.9033E-03	22907972	89417
2				437	6559	11.66	7.6475E+04	1	1.3076E-05	7.9660E-05	21985335	1751
3				434	6513	31.65	2.0615E+05	11	5.3359E-05	3.2506E-04	21007195	6829
4				420	6303	61.63	3.8850E+05	0	0.0000E+00	0.0000E+00	20656984	0
5				407	6108	101.61	6.2068E+05	2	3.2223E-06	1.9630E-05	20257309	398
6				405	6078	151.59	9.2138E+05	0	0.0000E+00	0.0000E+00	20257309	0
7				0	0	211.55	0.0000E+00	0	0.0000E+00	0.0000E+00	18296761	0
8				0	0	281.52	0.0000E+00	0	0.0000E+00	0.0000E+00	18296761	0
9				0	0	361.47	0.0000E+00	0	0.0000E+00	0.0000E+00	18296761	0
10				0	0	451.43	0.0000E+00	0	0.0000E+00	0.0000E+00	16927081	0
		TOTALS:				1665.78	2.2241E+06	21		4.3277E-03		98395

TRANSECT: 68 HALF ANGLE: 4.33

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	509	2203	7160	509	7160	1.36	9.7376E+03	12	1.2323E-03	7.5074E-03	27449328	206074
2				509	7160	9.52	6.8163E+04	5	7.3354E-05	4.4687E-04	27094570	12108
3				508	7146	25.84	1.8465E+05	10	5.4156E-05	3.2992E-04	25938402	8558
4				497	6991	50.32	3.5180E+05	0	0.0000E+00	0.0000E+00	25792717	0
5				487	6850	82.96	5.6832E+05	0	0.0000E+00	0.0000E+00	25652601	0
6				480	6752	123.76	8.3563E+05	9	1.0770E-05	6.5613E-05	25652601	1683
7				0	0	172.73	0.0000E+00	0	0.0000E+00	0.0000E+00	24971686	0
8				0	0	229.85	0.0000E+00	0	0.0000E+00	0.0000E+00	24971686	0
9				0	0	295.13	0.0000E+00	0	0.0000E+00	0.0000E+00	24971686	0
10				0	0	368.57	0.0000E+00	0	0.0000E+00	0.0000E+00	23849513	0
		TOTALS:				1360.34	2.0183E+06	36		8.3498E-03		228422

WILLISTON LAKE

DATE: Sept. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 69 HALF ANGLE: 4.82

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	523	2298	7469	523	7469	1.69	1.2598E+04	20	1.5876E-03	9.6714E-03	32292554	312314
2				523	7469	11.81	8.8186E+04	10	1.1340E-04	6.9081E-04	31424314	21708
3				518	7397	32.05	2.3707E+05	13	5.4835E-05	3.3406E-04	29682719	9916
4				512	7311	62.41	4.5632E+05	6	1.3149E-05	8.0102E-05	28830678	2309
5				488	6969	102.90	7.1705E+05	3	4.1838E-06	2.5488E-05	28156979	718
6				474	6769	153.50	1.0390E+06	3	2.8874E-06	1.7590E-05	28156979	495
7				421	6012	214.23	1.2879E+06	0	0.0000E+00	0.0000E+00	26608713	0
8				395	5641	285.07	1.6080E+06	2	1.2438E-06	7.5772E-06	26608713	202
9				0	0	366.04	0.0000E+00	0	0.0000E+00	0.0000E+00	26608713	0
10				0	0	457.13	0.0000E+00	0	0.0000E+00	0.0000E+00	24196899	0
			TOTALS:			1686.81	5.4461E+06	57		1.3827E-02		347662

6.3.3 - Appendix C3 - October 1988

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 3 HALF ANGLE: 4.38

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	327	1464	4758	327	4753	1.39	6.6223E+03	7	1.0571E-03	6.4398E-03	12006907	77322
2				22	320	9.74	3.1186E+03	10	3.2066E-03	1.9534E-02	10735124	209704
3				0	0	26.44	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
4				0	0	51.49	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
5				0	0	84.90	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	126.65	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	176.75	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	235.21	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	302.01	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	377.17	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1391.76	9.7406E+03	17		2.5974E-02		287026

TRANSECT: 4 HALF ANGLE: 4.84

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	216	979	3182	216	3182	1.70	5.4119E+03	4	7.3912E-04	4.5027E-03	14890368	67047
2				216	3182	11.91	3.7883E+04	56	1.4782E-03	9.0054E-03	13941449	125548
3				32	471	32.32	1.5233E+04	6	3.9387E-04	2.3995E-03	4188450	10050
4				0	0	62.93	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
5				0	0	103.76	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	154.78	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	216.02	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	287.45	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	369.10	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	460.95	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1700.91	5.8528E+04	66		1.5908E-02		202645

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 5 HALF ANGLE: 4.7

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	233	1060	3445	1060	15673	1.60	2.5131E+04	2	7.9584E-05	4.8482E-04	11013297	5339
2				223	3297	11.22	3.7009E+04	54	1.4591E-03	8.8889E-03	10523165	93513
3				165	2440	30.47	7.4326E+04	25	3.3636E-04	2.0491E-03	9980265	20450
4				0	0	59.33	0.0000E+00	0	0.0000E+00	0.0000E+00	5750245	0
5				0	0	97.81	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	145.92	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	203.64	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	270.99	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	347.96	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	434.55	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1603.49	1.3647E+05	81		1.1423E-02		119303

TRANSECT: 6 HALF ANGLE: 4.84

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	183	828	2691	183	2691	1.70	4.5771E+03	2	4.3695E-04	2.6619E-03	9830878	26169
2				183	2691	11.91	3.2040E+04	45	1.4045E-03	8.5562E-03	8636339	73894
3				180	2647	32.32	8.5540E+04	51	5.9621E-04	3.6321E-03	7786305	28281
4				55	809	62.93	5.0899E+04	0	0.0000E+00	0.0000E+00	7786305	0
5				0	0	103.76	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	154.78	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	216.02	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	287.45	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	369.10	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	460.95	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1700.91	1.7306E+05	98		1.1850E-02		128344

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 8 HALF ANGLE: 4.66

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	294	1307	4248	294	4248	1.58	6.6953E+03	2	2.9872E-04	1.8198E-03	11218164	20415
2				287	4147	11.03	4.5751E+04	42	9.1801E-04	5.5925E-03	11218164	62738
3				193	2788	29.95	8.3509E+04	29	3.4727E-04	2.1156E-03	10148166	21469
4				55	795	58.32	4.6343E+04	4	8.6312E-05	5.2582E-04	9862809	5186
5				0	0	96.15	0.0000E+00	0	0.0000E+00	0.0000E+00	6709475	0
6				0	0	143.43	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	200.18	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	266.38	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	342.03	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	427.15	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				1576.20	1.8230E+05	77		1.0054E-02		109807

TRANSECT: 10 HALF ANGLE: 4.87

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	188	855	2779	188	2779	1.72	4.7855E+03	1	2.0897E-04	1.2730E-03	15286385	19460
2				188	2779	12.06	3.3498E+04	12	3.5823E-04	2.1823E-03	15286385	33360
3				184	2720	32.72	8.8989E+04	133	1.4946E-03	9.1049E-03	15286385	139181
4				56	828	63.72	5.2742E+04	3	5.6881E-05	3.4652E-04	15286385	5297
5				36	532	135.05	5.5898E+04	0	0.0000E+00	0.0000E+00	15286385	0
6				0	0	156.72	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	218.71	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	291.05	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	373.71	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	466.71	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				1722.16	2.3591E+05	149		1.2907E-02		197298

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 11 HALF ANGLE: 4.13

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	48	227	738	48	738	1.24	9.1251E+02	0	0.0000E+00	0.0000E+00	4733593	0
2				48	738	8.66	6.3875E+03	2	3.1311E-04	1.9075E-03	4733593	9029
3				46	707	23.50	1.6615E+04	33	1.9861E-03	1.2100E-02	4733593	57274
4				45	692	45.76	3.1653E+04	0	0.0000E+00	0.0000E+00	4733593	0
5				36	553	75.45	4.1747E+04	0	0.0000E+00	0.0000E+00	4733593	0
6				7	108	112.56	1.2110E+04	0	0.0000E+00	0.0000E+00	4733593	0
7				0	0	157.08	0.0000E+00	0	0.0000E+00	0.0000E+00	1222345	0
8				0	0	209.03	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	268.40	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	335.19	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1236.88	1.0942E+05	35		1.4007E-02		66303

TRANSECT: 12 HALF ANGLE: 4.84

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	101	470	1528	101	1528	1.70	2.5981E+03	0	0.0000E+00	0.0000E+00	10043890	0
2				101	1528	11.91	1.8187E+04	5	2.7492E-04	1.6748E-03	10043890	16822
3				100	1512	32.32	4.8876E+04	93	1.9028E-03	1.1592E-02	10043890	116426
4				95	1437	62.93	9.0420E+04	21	2.3225E-04	1.4149E-03	10043890	14211
5				90	1361	103.76	1.4123E+05	0	0.0000E+00	0.0000E+00	10043890	0
6				27	408	154.78	6.3204E+04	0	0.0000E+00	0.0000E+00	10043890	0
7				18	272	216.02	5.8805E+04	0	0.0000E+00	0.0000E+00	2697965	0
8				0	0	287.45	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	369.10	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	460.95	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1700.91	4.2332E+05	119		1.4681E-02		147459

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 13 HALF ANGLE: 4.93

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	145	663	2155	145	2155	1.77	3.8033E+03	0	0.0000E+00	0.0000E+00	10122340	0
2				145	2155	12.36	2.6623E+04	4	1.5025E-04	9.1530E-04	10122340	9265
3				145	2155	33.54	7.2262E+04	87	1.2039E-03	7.3344E-03	10122340	74242
4				140	2080	65.31	1.3587E+05	10	7.3600E-05	4.4837E-04	10122340	4539
5				136	2021	107.67	2.1760E+05	0	0.0000E+00	0.0000E+00	10122340	0
6				78	1159	160.62	1.8618E+05	0	0.0000E+00	0.0000E+00	10122340	0
7				17	253	224.16	5.6630E+04	0	0.0000E+00	0.0000E+00	7436622	0
8				0	0	298.30	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	383.02	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	478.33	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1765.07	6.9896E+05	101		8.6981E-03		88045

TRANSECT: 14 HALF ANGLE: 4.9

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	279	1254	4076	279	4076	1.74	7.1058E+03	0	0.0000E+00	0.0000E+00	12156949	0
2				279	4076	12.20	4.9741E+04	2	4.0208E-05	2.4495E-04	12156949	2978
3				276	4032	33.13	1.3356E+05	95	7.1130E-04	4.3332E-03	12156949	52679
4				276	4032	64.51	2.6009E+05	51	1.9609E-04	1.1946E-03	12156949	14522
5				275	4017	106.36	4.2724E+05	9	2.1065E-05	1.2833E-04	12156949	1560
6				265	3871	158.66	6.1418E+05	0	0.0000E+00	0.0000E+00	12156949	0
7				113	1651	221.43	3.6550E+05	0	0.0000E+00	0.0000E+00	12156949	0
8				66	964	294.66	2.8408E+05	0	0.0000E+00	0.0000E+00	12156949	0
9				0	0	378.35	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	472.50	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1744.55	2.1415E+06	157		5.9011E-03		71739

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 15 HALF ANGLE: 4.86

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	382	1774	5766	382	5766	1.72	9.8882E+03	0	0.0000E+00	0.0000E+00	15812167	0
2				355	5358	12.01	6.4325E+04	21	3.2647E-04	1.9888E-03	15812167	31448
3				347	5237	32.59	1.7066E+05	92	5.3908E-04	3.2841E-03	15812167	51928
4				265	4000	63.46	2.5381E+05	53	2.0882E-04	1.2721E-03	15812167	20115
5				225	3396	104.62	3.5528E+05	6	1.6888E-05	1.0288E-04	15812167	1627
6				162	2445	156.07	3.8160E+05	0	0.0000E+00	0.0000E+00	15812167	0
7				77	1162	217.81	2.5313E+05	0	0.0000E+00	0.0000E+00	8554564	0
8				74	1117	289.85	3.2372E+05	0	0.0000E+00	0.0000E+00	0	0
9				52	785	372.17	2.9209E+05	0	0.0000E+00	0.0000E+00	0	0
10				0	0	464.78	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1715.06	2.1045E+06	172		6.6479E-03		105118

TRANSECT: 16 HALF ANGLE: 4.85

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	543	2593	8427	543	8427	1.71	1.4394E+04	8	5.5580E-04	3.3860E-03	26401385	89394
2				513	7962	11.96	9.5188E+04	19	1.9960E-04	1.2160E-03	26401385	32104
3				501	7775	32.45	2.5232E+05	127	5.0332E-04	3.0662E-03	26401385	80953
4				491	7620	63.20	4.8156E+05	75	1.5574E-04	9.4879E-04	26401385	25049
5				454	7046	104.19	7.3410E+05	6	8.1733E-06	4.9792E-05	26401385	1315
6				320	4966	155.43	7.7190E+05	0	0.0000E+00	0.0000E+00	26401385	0
7				149	2312	216.91	5.0160E+05	1	1.9936E-06	1.2145E-05	20677565	251
8				122	1893	288.65	5.4653E+05	0	0.0000E+00	0.0000E+00	20677565	0
9				102	1583	370.63	5.8672E+05	0	0.0000E+00	0.0000E+00	20677565	0
10				71	1102	462.86	5.1003E+05	0	0.0000E+00	0.0000E+00	11051114	0
			TOTALS:			1707.98	4.4943E+06	236		8.6789E-03		229066

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 17 HALF ANGLE: 4.76

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	750	3508	11401	750	11401	1.64	1.8753E+04	1	5.3324E-05	3.2485E-04	30207340	9813
2				708	10763	11.51	1.2392E+05	44	3.5506E-04	2.1630E-03	30207340	65340
3				629	9562	31.25	2.9833E+05	144	4.8188E-04	2.9356E-03	30207340	88677
4				492	7479	60.86	4.5518E+05	86	1.8894E-04	1.1510E-03	30207340	34769
5				485	7373	103.34	7.3976E+05	9	1.2166E-05	7.4116E-05	30207340	2239
6				250	3800	149.68	5.6885E+05	0	0.0000E+00	0.0000E+00	30207340	0
7				178	2706	208.90	5.6525E+05	0	0.0000E+00	0.0000E+00	19711507	0
8				40	608	277.99	1.6903E+05	0	0.0000E+00	0.0000E+00	19711507	0
9				40	608	356.94	2.1704E+05	0	0.0000E+00	0.0000E+00	19711507	0
10				35	532	445.76	2.3717E+05	0	0.0000E+00	0.0000E+00	7004862	0
			TOTALS:			1644.89	3.3938E+06	284		6.6486E-03		200837

TRANSECT: 18 HALF ANGLE: 4.89

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP
1	661	3140	10205	661	10205	1.74	1.7720E+04	0	0.0000E+00	0.0000E+00	28486093	0
2				661	10205	12.15	1.2404E+05	15	1.2093E-04	7.3670E-04	28486093	20986
3				603	9310	32.99	3.0714E+05	72	2.3442E-04	1.4281E-03	28486093	40681
4				586	9047	64.25	5.8125E+05	74	1.2731E-04	7.7559E-04	28486093	22093
5				580	8954	105.92	9.4846E+05	13	1.3706E-05	8.3499E-05	28486093	2379
6				350	5404	158.01	8.5383E+05	0	0.0000E+00	0.0000E+00	28486093	0
7				192	2964	220.52	6.5368E+05	0	0.0000E+00	0.0000E+00	19133818	0
8				155	2393	293.45	7.0223E+05	0	0.0000E+00	0.0000E+00	19133818	0
9				103	1590	376.80	5.9918E+05	0	0.0000E+00	0.0000E+00	19133818	0
10				97	1498	470.57	7.0470E+05	0	0.0000E+00	0.0000E+00	19133818	0
			TOTALS:			1736.40	5.4922E+06	174		3.0239E-03		86139

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 19 HALF ANGLE: 4.87

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	346	1679	5457	346	5457	1.72	9.3974E+03	0	0.0000E+00	0.0000E+00	21577003	0
2				346	5457	12.06	6.5782E+04	6	9.1211E-05	5.5566E-04	21577003	11989
3				337	5315	32.72	1.7391E+05	27	1.5526E-04	9.4582E-04	21577003	20408
4				333	5252	63.72	3.3464E+05	14	4.1836E-05	2.5487E-04	21577003	5499
5				330	5204	105.05	5.4673E+05	0	0.0000E+00	0.0000E+00	21577003	0
6				275	4337	156.72	6.7968E+05	0	0.0000E+00	0.0000E+00	21577003	0
7				250	3943	218.71	8.6233E+05	0	0.0000E+00	0.0000E+00	21577003	0
8				179	2823	291.05	8.2162E+05	0	0.0000E+00	0.0000E+00	21577003	0
9				167	2633	373.71	9.8426E+05	0	0.0000E+00	0.0000E+00	21577003	0
10				110	1735	466.71	8.0964E+05	0	0.0000E+00	0.0000E+00	15348603	0
			TOTALS:			1722.16	5.2880E+06	47		1.7563E-03		37897

TRANSECT: 20 HALF ANGLE: 4.83

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	338	1548	5031	338	5031	1.69	8.5218E+03	2	2.3469E-04	1.4297E-03	31344133	44814
2				338	5031	11.86	5.9652E+04	50	8.3819E-04	5.1062E-03	27175646	138766
3				232	3453	32.18	1.1114E+05	67	6.0286E-04	3.6727E-03	24519507	90052
4				223	3319	62.67	2.0803E+05	88	4.2302E-04	2.5770E-03	21135197	54466
5				220	3275	103.33	3.3835E+05	44	1.3004E-04	7.9222E-04	18032804	14286
6				203	3022	154.14	4.6575E+05	0	0.0000E+00	0.0000E+00	18032804	0
7				140	2084	215.12	4.4828E+05	0	0.0000E+00	0.0000E+00	18032804	0
8				111	1652	286.26	4.7296E+05	0	0.0000E+00	0.0000E+00	18032804	0
9				98	1459	367.57	5.3617E+05	0	0.0000E+00	0.0000E+00	18032804	0
10				62	923	459.03	4.2362E+05	0	0.0000E+00	0.0000E+00	11858975	0
			TOTALS:			1693.85	3.0725E+06	251		1.3578E-02		342384

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 21 HALF ANGLE: 4.49

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	667	2960	9620	667	9620	1.46	1.4072E+04	0	0.0000E+00	0.0000E+00	47755469	0
2				652	9404	10.24	9.6292E+04	20	2.0770E-04	1.2653E-03	44115313	55820
3				464	6692	27.79	1.8600E+05	83	4.4623E-04	2.7185E-03	41422214	112605
4				405	5841	54.12	3.1615E+05	100	3.1630E-04	1.9269E-03	39101380	75345
5				437	6303	89.23	5.6241E+05	45	8.0013E-05	4.8744E-04	19042762	9282
6				298	4298	133.12	5.7214E+05	9	1.5730E-05	9.5830E-05	19042762	1825
7				269	3880	185.78	7.2077E+05	0	0.0000E+00	0.0000E+00	16922145	0
8				98	1413	247.22	3.4943E+05	0	0.0000E+00	0.0000E+00	16922145	0
9				83	1197	317.43	3.8000E+05	0	0.0000E+00	0.0000E+00	16922145	0
10				57	822	396.43	3.2590E+05	0	0.0000E+00	0.0000E+00	13146341	0
		TOTALS:				1462.83	3.5232E+06	257		6.4940E-03		254876

TRANSECT: 22 HALF ANGLE: 4.81

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	875	3822	12422	875	12422	1.68	2.0865E+04	3	1.4378E-04	8.7590E-04	59908711	52474
2				875	12422	11.76	1.4606E+05	22	1.5062E-04	9.1761E-04	53292050	48901
3				865	12280	31.92	3.9191E+05	44	1.1227E-04	6.8395E-04	47403726	32422
4				777	11030	62.15	6.8556E+05	25	3.6467E-05	2.2216E-04	44875490	9969
5				655	9298	102.47	9.5278E+05	7	7.3469E-06	4.4758E-05	41586929	1861
6				518	8773	152.86	1.3411E+06	12	8.9481E-06	5.4512E-05	41586929	2267
7				614	8716	213.33	1.8595E+06	3	1.6133E-06	9.8285E-06	38643887	380
8				564	8007	283.88	2.2729E+06	3	1.3199E-06	8.0407E-06	38643887	311
9				549	7794	364.51	2.8409E+06	0	0.0000E+00	0.0000E+00	38643887	0
10				386	5480	455.22	2.4945E+06	0	0.0000E+00	0.0000E+00	34025831	0
		TOTALS:				1679.79	1.3006E+07	119		2.8167E-03		148585

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 23 HALF ANGLE: 4.68

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	1013	4454	14476	1013	14476	1.59	2.3013E+04	6	2.6072E-04	1.5883E-03	48248578	76633
2				1013	14476	11.13	1.6109E+05	14	8.6906E-05	5.2943E-04	42643517	22577
3				908	12975	30.21	3.9193E+05	24	6.1235E-05	3.7304E-04	37726444	14074
4				855	12218	58.82	7.1869E+05	20	2.7829E-05	1.6953E-04	32839843	5567
5				776	11089	96.98	1.0754E+06	14	1.3019E-05	7.9310E-05	27966604	2218
6				640	9145	144.67	1.3231E+06	8	6.0464E-06	3.6835E-05	27966604	1030
7				509	7273	201.91	1.4686E+06	0	0.0000E+00	0.0000E+00	22819172	0
8				479	6845	268.68	1.8390E+06	0	0.0000E+00	0.0000E+00	22819172	0
9				398	5687	341.99	1.9621E+06	0	0.0000E+00	0.0000E+00	22819172	0
10				340	4859	430.84	2.0932E+06	0	0.0000E+00	0.0000E+00	17882727	0
			TOTALS:			1589.82	1.1056E+07	86		2.7764E-03		122099

TRANSECT: 47 HALF ANGLE: 4.18

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	580	2510	8158	580	8158	1.27	1.0336E+04	4	3.8698E-04	2.3575E-03	20026072	47211
2				580	8158	8.87	7.2355E+04	12	1.6585E-04	1.0103E-03	19666436	19870
3				508	7145	24.08	1.7201E+05	11	6.3948E-05	3.8957E-04	19074381	7431
4				492	6920	46.88	3.2442E+05	24	7.3977E-05	4.5067E-04	17415351	7849
5				410	5767	77.29	4.4572E+05	18	4.0384E-05	2.4602E-04	16600609	4084
6				150	2110	115.31	2.4326E+05	4	1.6443E-05	1.0017E-04	16600609	1663
7				144	2025	160.92	3.2592E+05	0	0.0000E+00	0.0000E+00	16365524	0
8				136	1913	214.14	4.0961E+05	0	0.0000E+00	0.0000E+00	16365524	0
9				129	1814	274.96	4.9888E+05	0	0.0000E+00	0.0000E+00	16365524	0
10				89	1252	343.39	4.2984E+05	0	0.0000E+00	0.0000E+00	8741739	0
			TOTALS:			1267.12	2.9324E+06	73		4.5543E-03		88107

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 25 HALF ANGLE: 6.97

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	1486	7200	23400	1486	23400	5.54	1.2963E+05	6	4.6284E-05	2.8196E-04	22636793	6383
2				1486	23400	38.78	9.0744E+05	29	3.1958E-05	1.9469E-04	20164643	3926
3				1486	23400	105.26	2.4631E+06	58	2.3548E-05	1.4345E-04	18786915	2695
4				1372	21605	204.98	4.4285E+06	36	8.1291E-06	4.9523E-05	17445487	864
5				1186	18676	337.94	6.3113E+06	5	7.9223E-07	4.8263E-06	16494919	80
6				0	0	504.14	0.0000E+00	0	0.0000E+00	0.0000E+00	15289293	0
7				0	0	703.57	0.0000E+00	0	0.0000E+00	0.0000E+00	12495567	0
8				0	0	936.25	0.0000E+00	0	0.0000E+00	0.0000E+00	9384959	0
9				0	0	1202.17	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1501.33	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			5539.95	1.4240E+07	134		6.7445E-04		13947

TRANSECT: 26 HALF ANGLE: 6.8

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	494	2361	7673	488	7580	5.27	3.9951E+04	3	7.5093E-05	4.5747E-04	22636793	10356
2				462	7176	36.89	2.6475E+05	14	5.2879E-05	3.2214E-04	20164643	6496
3				367	5701	100.14	5.7085E+05	32	5.6057E-05	3.4150E-04	18786915	6416
4				360	5592	195.01	1.0905E+06	2	1.8341E-06	1.1173E-05	17445487	195
5				0	0	321.50	0.0000E+00	0	0.0000E+00	0.0000E+00	16494919	0
6				0	0	479.61	0.0000E+00	0	0.0000E+00	0.0000E+00	15289293	0
7				0	0	669.35	0.0000E+00	0	0.0000E+00	0.0000E+00	12495567	0
8				0	0	890.71	0.0000E+00	0	0.0000E+00	0.0000E+00	9384959	0
9				0	0	1143.69	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1428.30	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			5270.48	1.9660E+06	51		1.1323E-03		23462

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 30 HALF ANGLE: 2.93

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	468	2303	7485	466	7453	0.97	7.2369E+03	2	2.7636E-04	1.6836E-03	30655391	51611
2				230	3678	6.80	2.5003E+04	3	1.1999E-04	7.3095E-04	20528983	15006
3				130	2079	18.45	3.8359E+04	5	1.3035E-04	7.9409E-04	16285000	12932
4				87	1391	35.93	4.9990E+04	0	0.0000E+00	0.0000E+00	12895952	0
5				75	1199	59.23	7.1049E+04	0	0.0000E+00	0.0000E+00	10790344	0
6				50	800	88.36	7.0660E+04	0	0.0000E+00	0.0000E+00	9922525	0
7				45	720	123.32	8.8753E+04	0	0.0000E+00	0.0000E+00	7479302	0
8				35	560	164.10	9.1859E+04	0	0.0000E+00	0.0000E+00	4335630	0
9				23	368	210.71	7.7509E+04	0	0.0000E+00	0.0000E+00	0	0
10				0	0	263.15	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			971.03	5.2042E+05	10		3.2086E-03		79549

TRANSECT: 32 HALF ANGLE: 4.72

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	730	3306	10745	680	10009	2.53	2.5291E+04	17	6.7218E-04	4.0949E-03	28833181	118069
2				234	3444	17.69	6.0921E+04	2	3.2829E-05	2.0000E-04	17702089	3540
3				198	2914	48.01	1.3992E+05	0	0.0000E+00	0.0000E+00	11328163	0
4				193	2841	93.50	2.6559E+05	2	7.5303E-06	4.5875E-05	9348151	429
5				185	2723	154.14	4.1972E+05	0	0.0000E+00	0.0000E+00	8151996	0
6				161	2370	229.95	5.4491E+05	0	0.0000E+00	0.0000E+00	7967246	0
7				155	2281	320.92	7.3214E+05	0	0.0000E+00	0.0000E+00	7967246	0
8				20	294	427.05	1.2571E+05	0	0.0000E+00	0.0000E+00	3155175	0
9				0	0	548.34	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	684.80	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			2526.93	2.3142E+06	21		4.3408E-03		122038

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 36 HALF ANGLE: 4.77

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	608	2972	9659	608	9659	2.58	2.4930E+04	1	4.0113E-05	2.4437E-04	19543180	4776
2				540	8579	18.07	1.5499E+05	17	1.0968E-04	6.6819E-04	15726402	10508
3				460	7308	49.04	3.5837E+05	11	3.0695E-05	1.8699E-04	14927056	2791
4				265	4210	95.50	4.0203E+05	0	0.0000E+00	0.0000E+00	13107667	0
5				260	4130	157.44	6.5031E+05	0	0.0000E+00	0.0000E+00	11727483	0
6				125	1986	234.87	4.6641E+05	0	0.0000E+00	0.0000E+00	9719728	0
7				0	0	327.79	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	436.19	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	560.08	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	699.45	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			2581.00	2.0570E+06	29		1.0996E-03		18075

TRANSECT: 37 HALF ANGLE: 4.62

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	175	1661	5398	175	5390	2.42	1.3067E+04	3	2.2959E-04	1.3987E-03	13103878	18328
2				163	5028	16.94	8.5194E+04	19	2.2302E-04	1.3586E-03	11164613	15169
3				110	3393	45.99	1.5605E+05	15	9.6121E-05	5.8557E-04	11058616	6476
4				105	3239	89.56	2.9008E+05	25	8.6184E-05	5.2503E-04	10216525	5364
5				95	2938	147.65	4.3269E+05	9	2.0800E-05	1.2671E-04	9580011	1214
6				50	1542	220.27	3.3973E+05	2	5.8870E-06	3.5864E-05	7706988	276
7				0	0	307.41	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	409.07	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	525.25	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	655.96	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			2420.53	1.3168E+06	73		4.0305E-03		46827

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 25 FEET

TRANSECT: 38 HALF ANGLE: 6.82

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	289	2205	7166	286	7092	5.30	3.7600E+04	4	1.0638E-04	6.4809E-04	12934635	8383
2				284	7042	37.11	2.6136E+05	7	2.6783E-05	1.6316E-04	12399389	2023
3				270	6695	100.73	6.7443E+05	24	3.5586E-05	2.1679E-04	10884268	2360
4				225	5579	196.17	1.0945E+06	18	1.6446E-05	1.0019E-04	10821403	1084
5				220	5455	323.41	1.7643E+06	2	1.1336E-06	6.9059E-06	9806037	68
6				20	496	482.47	2.3927E+05	0	0.0000E+00	0.0000E+00	6736862	0
7				0	0	673.33	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	896.01	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	1150.50	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1436.79	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			5301.82	4.0714E+06	55		1.1351E-03		13917

TRANSECT: 40 HALF ANGLE: 6.5

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	262	2087	6783	262	6782	4.81	3.2637E+04	5	1.5320E-04	9.3330E-04	21028697	19626
2				250	6472	33.68	2.1800E+05	20	9.1745E-05	5.5891E-04	19543773	10923
3				110	2848	91.42	2.6035E+05	25	9.6025E-05	5.8498E-04	18246337	10674
4				95	2459	178.04	4.3786E+05	3	6.8515E-06	4.1739E-05	16927015	707
5				23	595	293.52	1.7477E+05	0	0.0000E+00	0.0000E+00	11648314	0
6				0	0	437.87	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	611.09	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	813.19	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	1044.15	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	1303.99	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			4811.77	1.1236E+06	53		2.1189E-03		41930

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 43 HALF ANGLE: 6.04

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	324	2530	8223	324	8223	2.66	2.1840E+04	23	1.0531E-03	6.4156E-03	21987073	141060
2				275	6979	18.59	1.2976E+05	38	2.9285E-04	1.7841E-03	20129607	35912
3				115	2919	50.46	1.4728E+05	9	6.1106E-05	3.7226E-04	14090908	5245
4				35	888	98.27	8.7292E+04	17	1.9475E-04	1.1864E-03	0	0
5				0	0	162.01	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	241.69	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	337.31	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	448.86	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	576.34	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	719.76	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				2655.95	3.8618E+05	87		9.7583E-03		182218

TRANSECT: 44 HALF ANGLE: 4.73

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	622	3199	10397	622	10397	1.62	1.6886E+04	36	2.1319E-03	1.2988E-02	29386288	381663
2				592	9896	11.37	1.1250E+05	215	1.9111E-03	1.1642E-02	26552744	309137
3				30	501	30.86	1.5474E+04	31	2.0033E-03	1.2204E-02	10491734	128043
4				0	0	60.09	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
5				0	0	99.07	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
6				0	0	147.80	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
7				0	0	206.26	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
8				0	0	274.48	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
9				0	0	352.43	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
10				0	0	440.14	0.0000E+00	0	0.0000E+00	0.0000E+00	0	0
		TOTALS:				1624.12	1.4486E+05	282		3.6834E-02		818843

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DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 48 HALF ANGLE: 4.76

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	211	931	3026	211	3026	1.64	4.9770E+03	0	0.0000E+00	0.0000E+00	14886139	0
2				211	3026	11.51	3.4839E+04	18	5.1666E-04	3.1475E-03	14886139	46854
3				211	3026	31.25	9.4563E+04	8	8.4599E-05	5.1538E-04	14886139	7672
4				206	2954	60.86	1.7979E+05	21	1.1681E-04	7.1158E-04	14886139	10593
5				204	2925	100.34	2.9353E+05	26	8.8578E-05	5.3962E-04	14231252	7679
6				199	2854	149.68	4.2715E+05	4	9.3644E-06	5.7048E-05	14231252	812
7				189	2710	208.90	5.6618E+05	0	0.0000E+00	0.0000E+00	12137102	0
8				125	1793	277.99	4.9829E+05	0	0.0000E+00	0.0000E+00	12137102	0
9				33	473	356.94	1.6891E+05	0	0.0000E+00	0.0000E+00	12137102	0
10				26	373	445.76	1.6620E+05	0	0.0000E+00	0.0000E+00	8682394	0
			TOTALS:			1644.89	2.4344E+06	77		4.9711E-03		73610

TRANSECT: 49 HALF ANGLE: 4.33

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	224	966	3140	224	3140	1.36	4.2699E+03	1	2.3420E-04	1.4267E-03	10986232	15675
2				224	3140	9.52	2.9889E+04	2	6.6914E-05	4.0764E-04	10986232	4478
3				222	3113	25.84	8.0403E+04	11	1.3681E-04	8.3345E-04	10920716	9102
4				239	3350	50.32	1.6856E+05	12	7.1190E-05	4.3369E-04	10920716	4736
5				215	3013	82.96	2.5000E+05	19	7.6001E-05	4.6300E-04	10920716	5056
6				213	2985	123.76	3.6948E+05	2	5.4131E-06	3.2976E-05	10920716	360
7				139	1943	172.73	3.3650E+05	0	0.0000E+00	0.0000E+00	9066216	0
8				72	1009	229.85	2.3194E+05	0	0.0000E+00	0.0000E+00	9066216	0
9				46	645	295.13	1.9028E+05	0	0.0000E+00	0.0000E+00	9066216	0
10				31	434	368.57	1.6014E+05	0	0.0000E+00	0.0000E+00	8640283	0
			TOTALS:			1360.04	1.8215E+06	47		3.5975E-03		39408

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DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 50 HALF ANGLE: 4.1

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	141	609	1979	141	1979	1.22	2.4125E+03	0	0.0000E+00	0.0000E+00	8865835	0
2				141	1979	8.53	1.6888E+04	0	0.0000E+00	0.0000E+00	8865835	0
3				130	1825	23.16	4.2262E+04	5	1.1831E-04	7.2074E-04	8865835	6390
4				118	1656	45.10	7.4703E+04	9	1.2048E-04	7.3395E-04	8865835	6507
5				117	1642	74.35	1.2212E+05	1	8.1890E-06	4.9887E-05	7791672	389
6				96	1348	110.92	1.4947E+05	0	0.0000E+00	0.0000E+00	7791672	0
7				87	1221	154.80	1.8905E+05	0	0.0000E+00	0.0000E+00	6683708	0
8				67	940	206.00	1.9374E+05	0	0.0000E+00	0.0000E+00	6683708	0
9				60	842	264.50	2.2277E+05	0	0.0000E+00	0.0000E+00	6683708	0
10				43	604	330.33	1.9938E+05	0	0.0000E+00	0.0000E+00	5877349	0
			TOTALS:			1218.91	1.2128E+06	15		1.5046E-03		13286

TRANSECT: 51 HALF ANGLE: 4.65

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	221	985	3201	221	3201	1.57	5.0241E+03	0	0.0000E+00	0.0000E+00	10356378	0
2				221	3201	10.99	3.5169E+04	0	0.0000E+00	0.0000E+00	9942153	0
3				221	3201	29.82	9.5457E+04	6	6.2855E-05	3.8291E-04	9814264	3758
4				202	2926	58.07	1.6991E+05	8	4.7084E-05	2.8684E-04	9311770	2671
5				200	2897	95.73	2.7735E+05	14	5.0478E-05	3.0751E-04	8809276	2709
6				195	2825	142.82	4.0340E+05	8	1.9831E-05	1.2081E-04	8809276	1064
7				189	2738	199.32	5.4567E+05	0	0.0000E+00	0.0000E+00	7430032	0
8				181	2622	265.23	6.9539E+05	0	0.0000E+00	0.0000E+00	7430032	0
9				160	2318	340.56	7.8930E+05	0	0.0000E+00	0.0000E+00	7430032	0
10				126	1825	425.31	7.7625E+05	0	0.0000E+00	0.0000E+00	5971869	0
			TOTALS:			1569.41	3.7929E+06	36		1.0981E-03		10202

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DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 52 HALF ANGLE: 4.46

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	152	670	2178	152	2178	1.44	3.1427E+03	0	0.0000E+00	0.0000E+00	5454198	0
2				152	2178	10.10	2.1999E+04	6	2.7274E-04	1.6615E-03	4965966	8251
3				131	1877	27.42	5.1462E+04	5	9.7159E-05	5.9189E-04	452442	268
4				86	1232	53.40	6.5790E+04	6	9.1199E-05	5.5558E-04	4205413	2336
5				78	1117	88.04	9.8375E+04	0	0.0000E+00	0.0000E+00	3902028	0
6				58	831	131.34	1.0913E+05	0	0.0000E+00	0.0000E+00	3902028	0
7				56	802	183.30	1.4705E+05	0	0.0000E+00	0.0000E+00	3062607	0
8				52	745	243.91	1.8170E+05	0	0.0000E+00	0.0000E+00	3062607	0
9				43	616	313.19	1.9293E+05	0	0.0000E+00	0.0000E+00	3062607	0
10				34	487	391.13	1.9051E+05	0	0.0000E+00	0.0000E+00	2386125	0
			TOTALS:			1443.27	1.3621E+06	17		2.8090E-03		10855

TRANSECT: 53 HALF ANGLE: 4.44

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	247	1064	3458	247	3458	1.43	4.9460E+03	1	2.0218E-04	1.2317E-03	11057001	13619
2				247	3458	10.01	3.4622E+04	0	0.0000E+00	0.0000E+00	10856538	0
3				243	3402	27.18	9.2452E+04	0	0.0000E+00	0.0000E+00	10601667	0
4				239	3346	52.92	1.7707E+05	2	1.1295E-05	6.8807E-05	10278984	707
5				236	3304	87.25	2.8827E+05	0	0.0000E+00	0.0000E+00	9394029	0
6				203	2842	130.16	3.6991E+05	0	0.0000E+00	0.0000E+00	9394029	0
7				155	2170	181.65	3.9418E+05	0	0.0000E+00	0.0000E+00	8538483	0
8				114	1596	241.72	3.8579E+05	0	0.0000E+00	0.0000E+00	8538483	0
9				63	882	310.38	2.7375E+05	0	0.0000E+00	0.0000E+00	8538483	0
10				60	840	387.61	3.2559E+05	0	0.0000E+00	0.0000E+00	7219279	0
			TOTALS:			1430.30	2.3466E+06	3		1.3005E-03		14326

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TRANSECT: 54 HALF ANGLE: 3.53

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	129	408	1326	129	1326	0.90	1.1971E+03	0	0.0000E+00	0.0000E+00	9503173	0
2				129	1326	6.32	8.3794E+03	0	0.0000E+00	0.0000E+00	9193474	0
3				121	1244	17.15	2.1334E+04	0	0.0000E+00	0.0000E+00	9080265	0
4				112	1151	33.40	3.8454E+04	4	1.0402E-04	6.3369E-04	9071645	5749
5				109	1120	55.07	6.1699E+04	0	0.0000E+00	0.0000E+00	7347420	0
6				100	1028	82.15	8.4443E+04	0	0.0000E+00	0.0000E+00	7347420	0
7				85	874	114.65	1.0017E+05	0	0.0000E+00	0.0000E+00	6173157	0
8				81	833	152.57	1.2703E+05	0	0.0000E+00	0.0000E+00	6173157	0
9				75	771	195.90	1.5102E+05	0	0.0000E+00	0.0000E+00	6173157	0
10				62	637	244.65	1.5591E+05	0	0.0000E+00	0.0000E+00	5203489	0
			TOTALS:			902.76	7.4964E+05	4		6.3369E-04		5749

TRANSECT: 55 HALF ANGLE: 4.43

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	166	729	2369	166	2369	1.42	3.3734E+03	0	0.0000E+00	0.0000E+00	10997296	0
2				166	2369	9.97	2.3614E+04	2	8.4695E-05	5.1596E-04	10227551	5277
3				160	2284	27.05	6.1779E+04	0	0.0000E+00	0.0000E+00	10036817	0
4				149	2127	52.68	1.1203E+05	1	8.9258E-06	5.4376E-05	10036817	546
5				149	2127	86.85	1.8471E+05	0	0.0000E+00	0.0000E+00	8738749	0
6				149	2127	129.57	2.7554E+05	3	1.0888E-05	6.6327E-05	8738749	580
7				144	2055	180.83	3.7165E+05	0	0.0000E+00	0.0000E+00	8142039	0
8				140	1998	240.63	4.8082E+05	0	0.0000E+00	0.0000E+00	8142039	0
9				139	1984	308.97	6.1297E+05	0	0.0000E+00	0.0000E+00	8142039	0
10				127	1813	385.86	6.9942E+05	0	0.0000E+00	0.0000E+00	6642657	0
			TOTALS:			1423.84	2.8259E+06	6		6.3667E-04		6402

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CONTOUR INTERVALS: 20 FEET

TRANSECT: 56 HALF ANGLE: 5

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	162	701	2278	162	2278	1.82	4.1369E+03	0	0.0000E+00	0.0000E+00	12574064	0
2				156	2194	12.71	2.7885E+04	0	0.0000E+00	0.0000E+00	11835854	0
3				153	2152	34.50	7.4234E+04	0	0.0000E+00	0.0000E+00	10214738	0
4				155	2180	67.18	1.4645E+05	0	0.0000E+00	0.0000E+00	9111890	0
5				143	2011	110.76	2.2275E+05	0	0.0000E+00	0.0000E+00	8716585	0
6				141	1983	165.24	3.2765E+05	0	0.0000E+00	0.0000E+00	8716585	0
7				141	1983	230.61	4.5728E+05	0	0.0000E+00	0.0000E+00	7508914	0
8				138	1941	306.87	5.9555E+05	0	0.0000E+00	0.0000E+00	7508914	0
9				136	1913	394.03	7.5362E+05	0	0.0000E+00	0.0000E+00	7508914	0
10				132	1856	492.08	9.1348E+05	0	0.0000E+00	0.0000E+00	5809570	0
			TOTALS:			1815.81	3.5230E+06	0		0.0000E+00		0

TRANSECT: 57 HALF ANGLE: 3.84

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	239	1020	3315	239	3315	1.07	3.5430E+03	4	1.1290E-03	6.8778E-03	9406394	64696
2				239	3315	7.48	2.4801E+04	4	1.6128E-04	9.8255E-04	9033179	8876
3				167	2316	20.31	4.7037E+04	2	4.2520E-05	2.5903E-04	8130234	2098
4				129	1789	39.54	7.0756E+04	0	0.0000E+00	0.0000E+00	7222810	0
5				124	1720	65.20	1.1213E+05	0	0.0000E+00	0.0000E+00	6584606	0
6				116	1609	97.26	1.5648E+05	0	0.0000E+00	0.0000E+00	6584606	0
7				114	1581	135.73	2.1462E+05	0	0.0000E+00	0.0000E+00	5294157	0
8				110	1526	188.62	2.7558E+05	0	0.0000E+00	0.0000E+00	5294157	0
9				104	1443	231.92	3.3455E+05	0	0.0000E+00	0.0000E+00	5294157	0
10				101	1401	289.64	4.0575E+05	0	0.0000E+00	0.0000E+00	4757990	0
			TOTALS:			1068.77	1.6453E+06	10		8.1194E-03		75669

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CONTOUR INTERVALS: 20 FEET

TRANSECT: 58 HALF ANGLE: 4.68

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	188	823	2675	188	2675	1.59	4.2524E+03	0	0.0000E+00	0.0000E+00	16069543	0
2				188	2675	11.13	2.9767E+04	3	1.0078E-04	6.1398E-04	14872896	9132
3				188	2675	30.21	8.0795E+04	0	0.0000E+00	0.0000E+00	14243614	0
4				186	2646	58.82	1.5566E+05	0	0.0000E+00	0.0000E+00	13879865	0
5				186	2646	96.98	2.5663E+05	0	0.0000E+00	0.0000E+00	13807497	0
6				182	2589	144.67	3.7461E+05	0	0.0000E+00	0.0000E+00	13807497	0
7				180	2561	201.91	5.1707E+05	0	0.0000E+00	0.0000E+00	12725589	0
8				175	2490	268.68	6.6896E+05	0	0.0000E+00	0.0000E+00	12725589	0
9				174	2476	344.99	8.5405E+05	0	0.0000E+00	0.0000E+00	12725589	0
10				172	2447	430.84	1.0543E+06	0	0.0000E+00	0.0000E+00	12062498	0
			TOTALS:			1589.82	3.9961E+06	3		6.1398E-04		9132

TRANSECT: 59 HALF ANGLE: 4.53

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	253	1097	3565	253	3565	1.49	5.3091E+03	0	0.0000E+00	0.0000E+00	13464870	0
2				253	3565	10.42	3.7164E+04	8	2.1526E-04	1.3114E-03	127752516	167534
3				216	3044	28.29	8.6120E+04	12	1.3934E-04	8.4886E-04	11975810	10166
4				163	2297	55.10	1.2656E+05	12	9.4818E-05	5.7763E-04	11291412	6522
5				162	2283	90.84	2.0737E+05	6	2.8934E-05	1.7627E-04	10323420	1820
6				158	2227	135.51	3.0172E+05	0	0.0000E+00	0.0000E+00	10323420	0
7				155	2184	189.12	4.1308E+05	0	0.0000E+00	0.0000E+00	9155318	0
8				149	2100	251.66	5.2841E+05	0	0.0000E+00	0.0000E+00	9155318	0
9				146	2057	323.14	6.6483E+05	0	0.0000E+00	0.0000E+00	9155318	0
10				143	2015	403.55	8.1321E+05	0	0.0000E+00	0.0000E+00	8769453	0
			TOTALS:			1489.12	3.1838E+06	38		2.9141E-03		186041

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 60 HALF ANGLE: 4.57

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	179	785	2551	179	2551	1.52	3.8668E+03	1	2.5861E-04	1.5755E-03	14610074	23018
2				177	2523	10.61	2.6765E+04	3	1.1209E-04	6.8283E-04	14232375	9718
3				174	2480	28.80	7.1417E+04	3	4.2007E-05	2.5591E-04	13369434	3421
4				160	2280	56.08	1.2788E+05	12	9.3834E-05	5.7164E-04	12634660	7222
5				157	2238	92.45	2.0688E+05	7	3.3835E-05	2.0613E-04	11946682	2463
6				137	1953	137.92	2.6931E+05	0	0.0000E+00	0.0000E+00	11946682	0
7				133	1896	192.49	3.6488E+05	0	0.0000E+00	0.0000E+00	10973892	0
8				123	1753	256.14	4.4904E+05	0	0.0000E+00	0.0000E+00	10973892	0
9				119	1696	328.90	5.5783E+05	0	0.0000E+00	0.0000E+00	10973892	0
10				114	1625	410.74	6.6738E+05	0	0.0000E+00	0.0000E+00	8763796	0
			TOTALS:			1515.65	2.7453E+06	26		3.2920E-03		45842

TRANSECT: 61 HALF ANGLE: 5.56

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	270	1172	3809	270	3809	2.25	8.5628E+03	1	1.1678E-04	7.1145E-04	16358515	11638
2				270	3809	15.74	5.9939E+04	4	6.6734E-05	4.0654E-04	16203514	6587
3				226	3188	42.71	1.3618E+05	0	0.0000E+00	0.0000E+00	15579840	0
4				165	2328	83.18	1.9361E+05	3	1.5495E-05	9.4394E-05	15027722	1419
5				161	2271	137.13	3.1146E+05	1	3.2107E-06	1.9559E-05	14606587	286
6				152	2144	204.57	4.3867E+05	0	0.0000E+00	0.0000E+00	14606587	0
7				147	2074	285.50	5.9207E+05	0	0.0000E+00	0.0000E+00	11605162	0
8				138	1947	379.92	7.3964E+05	0	0.0000E+00	0.0000E+00	11605162	0
9				133	1876	487.82	9.1530E+05	0	0.0000E+00	0.0000E+00	11605162	0
10				129	1820	609.22	1.1087E+06	0	0.0000E+00	0.0000E+00	9554665	0
			TOTALS:			2248.03	4.5041E+06	9		1.2320E-03		19930

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 62 HALF ANGLE: 4.42

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	330	1444	4693	330	4693	1.42	6.6518E+03	0	0.0000E+00	0.0000E+00	29104669	0
2				330	4693	9.92	4.6563E+04	7	1.5033E-04	9.1584E-04	28941906	26506
3				330	4693	26.93	1.2638E+05	18	1.4242E-04	8.6764E-04	28235680	24498
4				323	4593	52.44	2.4090E+05	14	5.8116E-05	3.5404E-04	28118253	9955
5				310	4409	86.46	3.8117E+05	0	0.0000E+00	0.0000E+00	28012205	0
6				242	3442	128.98	4.4390E+05	0	0.0000E+00	0.0000E+00	28012205	0
7				240	3413	180.01	6.1439E+05	0	0.0000E+00	0.0000E+00	25633787	0
8				237	3370	239.54	8.0735E+05	0	0.0000E+00	0.0000E+00	25633787	0
9				234	3328	307.57	1.0235E+06	0	0.0000E+00	0.0000E+00	25633787	0
10				232	3299	384.11	1.2673E+06	0	0.0000E+00	0.0000E+00	23592667	0
		TOTALS:				1417.39	4.9582E+06	39		2.1375E-03		60959

TRANSECT: 63 HALF ANGLE: 4.42

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	421	1854	6026	421	6026	1.42	8.5405E+03	1	1.1709E-04	7.1331E-04	22562665	16094
2				421	6026	9.92	5.9784E+04	0	0.0000E+00	0.0000E+00	22394532	0
3				418	5983	26.93	1.6111E+05	11	6.8275E-05	4.1593E-04	21559021	8967
4				415	5940	52.44	3.1150E+05	2	6.4206E-06	3.9115E-05	21260684	832
5				412	5897	86.46	5.0983E+05	0	0.0000E+00	0.0000E+00	21227605	0
6				408	5839	128.98	7.5319E+05	0	0.0000E+00	0.0000E+00	21227605	0
7				404	5782	180.01	1.0438E+06	0	0.0000E+00	0.0000E+00	20513413	0
8				398	5696	239.54	1.3645E+06	0	0.0000E+00	0.0000E+00	20513413	0
9				390	5582	307.57	1.7168E+06	0	0.0000E+00	0.0000E+00	20513413	0
10				388	5553	384.11	2.1331E+06	0	0.0000E+00	0.0000E+00	19920202	0
		TOTALS:				1417.39	8.0592E+06	14		1.1684E-03		25893

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 64 HALF ANGLE: 4.97

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	307	1339	4352	307	4352	1.79	7.8069E+03	0	0.0000E+00	0.0000E+00	21116014	0
2				307	4352	12.56	5.4648E+04	4	7.3195E-05	1.4590E-04	20724918	9241
3				293	4153	34.09	1.4157E+05	5	3.5319E-05	2.1516E-04	19817034	4264
4				281	3983	66.38	2.6439E+05	13	4.9169E-05	2.9954E-04	19482193	5836
5				281	3983	109.43	4.3589E+05	3	6.8825E-06	4.1923E-05	19242003	807
6				268	3799	163.25	6.2818E+05	0	0.0000E+00	0.0000E+00	19242003	0
7				265	3756	227.83	8.5584E+05	0	0.0000E+00	0.0000E+00	17948514	0
8				254	3600	303.18	1.0916E+06	0	0.0000E+00	0.0000E+00	17948514	0
9				252	3572	389.29	1.3906E+06	0	0.0000E+00	0.0000E+00	17948514	0
10				247	3501	486.17	1.7022E+06	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1793.97	6.5647E+06	25		1.0025E-03		20148

TRANSECT: 65 HALF ANGLE: 4.65

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	281	1332	4329	281	4329	1.57	6.7940E+03	0	0.0000E+00	0.0000E+00	21766176	0
2				281	4329	10.99	4.7558E+04	1	2.1027E-05	1.2810E-04	21258170	2723
3				280	4314	29.82	1.2863E+05	8	6.2196E-05	3.7890E-04	20670432	7832
4				276	4252	58.07	2.4690E+05	8	3.2401E-05	1.9739E-04	20337791	4014
5				274	4221	95.73	4.0411E+05	9	2.2271E-05	1.3568E-04	20137886	2732
6				270	4160	142.82	5.9405E+05	0	0.0000E+00	0.0000E+00	20137886	0
7				268	4129	199.32	8.2292E+05	0	0.0000E+00	0.0000E+00	19400671	0
8				263	4052	265.23	1.0746E+06	0	0.0000E+00	0.0000E+00	19400671	0
9				254	3913	340.56	1.3326E+06	0	0.0000E+00	0.0000E+00	19400671	0
10				252	3882	425.31	1.6512E+06	0	0.0000E+00	0.0000E+00	0	0
			TOTALS:			1569.41	6.3094E+06	26		8.1006E-04		17302

WILLISTON LAKE

DATE: Oct. 1988
CONTOUR INTERVALS: 20 FEET

TRANSECT: 67 HALF ANGLE: 4.39

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	344	1609	5229	344	5229	1.40	7.3112E+03	3	4.1033E-04	2.4997E-03	22907972	57263
2				342	5199	9.79	5.0881E+04	7	1.3758E-04	8.3811E-04	21985335	18426
3				339	5153	26.56	1.3689E+05	4	2.9220E-05	1.7801E-04	21007195	3739
4				336	5108	51.73	2.6422E+05	0	0.0000E+00	0.0000E+00	20656984	0
5				333	5062	85.29	4.3172E+05	0	0.0000E+00	0.0000E+00	20257309	0
6				319	4849	127.23	6.1697E+05	0	0.0000E+00	0.0000E+00	20257309	0
7				308	4682	177.56	8.3136E+05	0	0.0000E+00	0.0000E+00	18296761	0
8				290	4408	236.29	1.0416E+06	0	0.0000E+00	0.0000E+00	18296761	0
9				271	4120	303.40	1.2499E+06	0	0.0000E+00	0.0000E+00	18296761	0
10				269	4089	378.98	1.5494E+06	0	0.0000E+00	0.0000E+00	16927081	0
		TOTALS:				1398.14	6.1802E+06	14		3.5158E-03		79429

TRANSECT: 69 HALF ANGLE: 4.64

STRATUM NUMBER	LENGTH (mm)	TIME (sec)	TOT. PINGS	STRAT. LENGTH	STRAT. PINGS	FRUSTUM VOLUME	SAMPLED VOLUME	NO. OF TARGETS	VOLUME DENSITY	SURFACE AREA DENSITY	STRATUM AREA	FISH POP.
1	491	2234	7261	491	7261	1.56	1.1346E+04	0	0.0000E+00	0.0000E+00	32292554	0
2				491	7261	10.94	7.9419E+04	6	7.5549E-05	4.6024E-04	31424314	14463
3				483	7142	29.69	2.1205E+05	24	1.1318E-04	6.8949E-04	29682719	20466
4				472	6980	57.82	4.0354E+05	15	3.7171E-05	2.2645E-04	28830678	6529
5				465	6876	95.32	6.5543E+05	0	0.0000E+00	0.0000E+00	28156979	0
6				427	6314	142.20	8.9787E+05	0	0.0000E+00	0.0000E+00	28156979	0
7				391	5782	198.45	1.1474E+06	0	0.0000E+00	0.0000E+00	26608713	0
8				299	4421	264.09	1.1676E+06	0	0.0000E+00	0.0000E+00	26608713	0
9				267	3948	339.09	1.3388E+06	0	0.0000E+00	0.0000E+00	26608713	0
10				243	3593	423.47	1.5217E+06	0	0.0000E+00	0.0000E+00	24196899	0
		TOTALS:				1562.64	7.4352E+06	45		1.3762E-03		41457

6.4 - Appendix D: Target strength vs depth tables.

Tables of acoustic target strengths by depths for hydroacoustic surveys of Williston Lake, 1988.

FILE NUMBER 1 = a:t5.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	1	0	0	0	0	0	0	0	0	1
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	1	0	0	0	0	0	0	0	1
-44	0	1	1	0	0	0	0	0	0	0	2
-42	0	0	0	0	0	0	0	0	0	0	0
-40	1	0	0	0	0	0	0	0	0	0	1
-38	0	1	0	0	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	1	0	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	4	2	0	0	0	0	0	0	0	7

TOTAL NUMBER OF RECORDED ECHOES = 11

NUMBER OF ECHOES USED FOR STATISTICS = 7

AVERAGE BACKSCATTERING CROSS SECTION = .1023E-03 IN dB = -39.90

BACKSCATTERING CROSS SECTION STD DEV = .1161E-03

AVERAGE TARGET STRENGTH IN dB = -42.39

TARGET STRENGTH STD DEV IN dB = 5.15

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 7
ESTIMATED VOLUME IN CUBIC METERS = .357E+07
DENSITY IN FISH PER CUBIC METER = .196E-05

FILE NUMBER 1 = a:t9.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	1	0	0	0	0	0	0	1
-48	0	1	0	0	0	0	0	0	0	0	1
-46	1	1	0	0	0	0	0	0	0	0	2
-44	0	1	0	0	0	0	0	0	0	0	1
-42	0	1	0	1	0	0	0	0	0	0	2
-40	0	0	0	1	0	0	0	0	0	0	1
-38	0	0	0	1	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	4	0	4	0	0	0	0	0	0	9

TOTAL NUMBER OF RECORDED ECHOES = 13

NUMBER OF ECHOES USED FOR STATISTICS = 9

AVERAGE BACKSCATTERING CROSS SECTION = .3649E-04 IN dB = -42.48

BACKSCATTERING CROSS SECTION STD DEV = .3197E-04

AVERAGE TARGET STRENGTH IN dB = -43.99

TARGET STRENGTH STD DEV IN dB = 3.89

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 9
ESTIMATED VOLUME IN CUBIC METERS = .184E+07
DENSITY IN FISH PER CUBIC METER = .489E-05

FILE NUMBER 1 = a:t10.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	1	0	0	0	0	0	0	0	1
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	1	0	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	0	2	0	0	0	0	0	0	0	2

TOTAL NUMBER OF RECORDED ECHOES = 7

NUMBER OF ECHOES USED FOR STATISTICS = 2

AVERAGE BACKSCATTERING CROSS SECTION = .6272E-04 IN dB = -42.03

BACKSCATTERING CROSS SECTION STD DEV = .4812E-04

AVERAGE TARGET STRENGTH IN dB = -42.78

TARGET STRENGTH STD DEV IN dB = 3.73

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 2
ESTIMATED VOLUME IN CUBIC METERS = .261E+07
DENSITY IN FISH PER CUBIC METER = .767E-06

FILE NUMBER 1 = art16.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	2	0	0	0	0	0	0	0	2
-52	0	0	1	0	0	0	0	0	0	0	1
-50	1	0	0	0	0	0	0	0	0	0	1
-48	0	0	2	1	0	0	0	0	0	0	3
-46	0	1	3	1	0	0	0	0	0	0	5
-44	1	0	0	0	0	0	0	0	0	0	1
-42	0	0	6	0	0	0	0	0	0	0	6
-40	0	0	4	0	0	0	0	0	0	0	4
-38	0	1	5	0	0	0	0	0	0	0	6
-36	0	0	2	0	0	0	0	0	0	0	2
-34	0	0	2	0	0	0	0	0	0	0	2
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	2	27	2	0	0	0	0	0	0	33

TOTAL NUMBER OF RECORDED ECHOES = 39

NUMBER OF ECHOES USED FOR STATISTICS = 33

AVERAGE BACKSCATTERING CROSS SECTION = .1019E-03 IN dB = -39.92

BACKSCATTERING CROSS SECTION STD DEV = .1114E-03

AVERAGE TARGET STRENGTH IN dB = -42.57

TARGET STRENGTH STD DEV IN dB = 5.45

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 33
ESTIMATED VOLUME IN CUBIC METERS = .100E+08
DENSITY IN FISH PER CUBIC METER = .329E-05

FILE NUMBER 1 = a:t18.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	1	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	2	0	0	0	0	0	0	0	2
-50	0	0	0	0	0	0	0	0	0	0	0
-48	1	0	1	0	0	0	0	0	0	0	2
-46	0	1	7	0	0	0	0	0	0	0	8
-44	0	0	5	0	1	0	0	0	0	0	6
-42	1	0	8	1	0	0	0	0	0	0	10
-40	0	5	14	2	1	0	0	0	0	0	22
-38	0	3	11	0	0	0	0	1	0	0	15
-36	0	0	7	0	0	0	0	0	0	0	7
-34	0	0	3	0	0	0	0	0	0	0	3
-32	0	1	1	0	0	0	0	0	0	0	2
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	10	60	3	2	0	0	1	0	0	78

TOTAL NUMBER OF RECORDED ECHOES = 104

NUMBER OF ECHOES USED FOR STATISTICS = 78

AVERAGE BACKSCATTERING CROSS SECTION = .1280E-03 IN dB = -38.93

BACKSCATTERING CROSS SECTION STD DEV = .1196E-03

AVERAGE TARGET STRENGTH IN dB = -40.70

TARGET STRENGTH STD DEV IN dB = 4.41

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 78
ESTIMATED VOLUME IN CUBIC METERS = .890E+07
DENSITY IN FISH PER CUBIC METER = .877E-05

FILE NUMBER 1 = a:t20.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	1	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	1	0	1	0	0	0	0	0	2
-52	0	1	0	0	2	0	0	0	0	0	3
-50	0	4	1	1	0	0	0	0	0	0	6
-48	0	1	1	0	0	0	0	0	0	0	2
-46	0	2	3	0	0	0	0	0	0	0	5
-44	0	3	2	3	0	0	1	0	0	0	9
-42	0	3	5	4	0	1	0	0	0	0	13
-40	0	2	6	4	1	0	0	0	0	0	13
-38	0	1	2	0	2	0	0	0	0	0	5
-36	0	0	2	2	1	3	0	0	0	0	8
-34	0	0	2	0	0	0	0	0	0	0	2
-32	0	1	2	1	0	0	0	0	0	0	4
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	1	0	0	1
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	18	27	15	8	4	1	1	0	0	74

TOTAL NUMBER OF RECORDED ECHOES = 110

NUMBER OF ECHOES USED FOR STATISTICS = 74

AVERAGE BACKSCATTERING CROSS SECTION = .3157E-03 IN dB = -35.01

BACKSCATTERING CROSS SECTION STD DEV = .1697E-02

AVERAGE TARGET STRENGTH IN dB = -41.88

TARGET STRENGTH STD DEV IN dB = 6.22

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 74
ESTIMATED VOLUME IN CUBIC METERS = .123E+08
DENSITY IN FISH PER CUBIC METER = .601E-05

FILE NUMBER 1 = a:t21.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	2	0	0	0	0	0	0	2
-64	0	1	0	0	0	0	0	0	0	0	1
-62	0	0	1	0	0	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	1	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	1	0	0	0	0	0	0	0	0	1
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	1	0	0	0	0	0	0	0	0	1
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	1	0	0	0	0	0	0	0	0	1
-40	0	1	0	0	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	5	2	2	0	0	0	0	0	0	9

TOTAL NUMBER OF RECORDED ECHOES = 17

NUMBER OF ECHOES USED FOR STATISTICS = 9

AVERAGE BACKSCATTERING CROSS SECTION = .1940E-04 IN dB = -47.12

BACKSCATTERING CROSS SECTION STD DEV = .2862E-04

AVERAGE TARGET STRENGTH IN dB = -54.68

TARGET STRENGTH STD DEV IN dB = 10.12

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 9
ESTIMATED VOLUME IN CUBIC METERS = .112E+00
DENSITY IN FISH PER CUBIC METER = .801E-06

FILE NUMBER 1 = art22.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	1	0	0	0	0	0	1
-66	0	0	2	0	0	0	0	0	0	0	2
-64	0	0	0	0	0	0	0	0	0	0	0
-62	1	0	0	0	1	0	0	0	0	0	2
-60	0	1	1	2	1	1	0	0	0	0	6
-58	0	1	0	0	2	0	0	0	0	0	3
-56	0	1	2	1	1	0	0	0	0	0	5
-54	1	0	0	1	1	0	0	0	0	0	3
-52	0	1	1	0	0	0	0	0	0	0	2
-50	0	1	2	1	0	1	0	0	0	0	5
-48	1	3	5	3	0	0	0	0	0	0	12
-46	0	3	2	1	0	0	0	0	0	0	6
-44	0	1	0	5	0	0	0	0	0	0	6
-42	1	2	4	3	0	0	0	0	0	0	10
-40	0	0	1	5	0	0	0	0	0	0	6
-38	0	0	0	1	0	0	0	0	0	0	1
-36	0	0	1	0	0	0	0	0	0	0	1
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	4	14	22	23	7	2	0	0	0	0	72

TOTAL NUMBER OF RECORDED ECHOES = 108

NUMBER OF ECHOES USED FOR STATISTICS = 72

AVERAGE BACKSCATTERING CROSS SECTION = .3700E-04 IN dB = -44.32

BACKSCATTERING CROSS SECTION STD DEV = .5747E-04

AVERAGE TARGET STRENGTH IN dB = -49.22

TARGET STRENGTH STD DEV IN dB = 7.78

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 72
ESTIMATED VOLUME IN CUBIC METERS = .127E+08
DENSITY IN FISH PER CUBIC METER = .565E-05

FILE NUMBER 1 = a:t25a.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	1	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	1	1	0	0	0	0	0	0	0	2
-50	0	5	1	0	0	0	0	0	0	0	6
-48	0	3	1	0	0	0	0	0	0	0	4
-46	0	4	1	0	0	0	0	0	0	0	5
-44	1	9	5	0	0	0	0	0	0	0	15
-42	0	8	1	0	0	0	0	0	0	0	9
-40	0	5	2	0	0	0	0	0	0	0	7
-38	0	3	0	0	0	0	0	0	0	0	3
-36	0	0	1	0	0	0	0	0	0	0	1
-34	0	1	1	0	0	0	0	0	0	0	2
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	1	0	0	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	40	14	1	0	0	0	0	0	0	56

TOTAL NUMBER OF RECORDED ECHOES = 72

NUMBER OF ECHOES USED FOR STATISTICS = 56

AVERAGE BACKSCATTERING CROSS SECTION = .8121E-04 IN dB = -40.90

BACKSCATTERING CROSS SECTION STD DEV = .1377E-03

AVERAGE TARGET STRENGTH IN dB = -43.02

TARGET STRENGTH STD DEV IN dB = 4.98

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 5

NUMBER OF FISH USED = 56
ESTIMATED VOLUME IN CUBIC METERS = .181E+08
DENSITY IN FISH PER CUBIC METER = .309E-05

FILE NUMBER 1 = alt25b.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	1	1	1	0	0	0	0	0	0	0	3
-54	0	3	1	0	0	0	0	0	0	0	4
-52	0	1	6	0	0	0	0	0	0	0	7
-50	2	5	3	1	0	0	0	0	0	0	11
-48	0	7	8	2	0	0	0	0	0	0	17
-46	4	9	9	1	0	0	0	0	0	0	23
-44	1	10	5	0	0	0	0	0	0	0	16
-42	1	10	11	2	0	0	0	0	0	0	24
-40	1	6	13	1	0	0	0	0	0	0	21
-38	0	2	7	0	0	0	0	0	0	0	9
-36	0	1	3	0	0	0	0	0	0	0	4
-34	1	4	0	0	0	0	0	0	0	0	5
-32	0	2	2	0	0	0	0	0	0	0	4
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	11	81	69	7	0	0	0	0	0	0	148

TOTAL NUMBER OF RECORDED ECHOES = 187

NUMBER OF ECHOES USED FOR STATISTICS = 148

AVERAGE BACKSCATTERING CROSS SECTION = .7819E-04 IN dB = -41.07

BACKSCATTERING CROSS SECTION STD DEV = .1104E-03

AVERAGE TARGET STRENGTH IN dB = -44.06

TARGET STRENGTH STD DEV IN dB = 5.18

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 148
ESTIMATED VOLUME IN CUBIC METERS = .613E+08
DENSITY IN FISH PER CUBIC METER = .242E-05

FILE NUMBER 1 = a:t20.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

	FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
	TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS												SUM
-74	:	0	0	0	0	0	0	0	0	0	0	0
-72	:	0	0	0	0	0	0	0	0	0	0	0
-70	:	0	0	0	0	0	0	0	0	0	0	0
-68	:	0	0	0	0	0	0	0	0	0	0	0
-66	:	0	0	0	0	0	0	0	0	0	0	0
-64	:	0	0	0	0	0	0	0	0	0	0	0
-62	:	0	0	0	0	0	0	0	0	0	0	0
-60	:	0	0	0	0	0	0	0	0	0	0	0
-58	:	0	0	0	0	0	0	0	0	0	0	0
-56	:	0	0	0	0	0	0	0	0	0	0	0
-54	:	0	0	0	0	0	0	0	0	0	0	0
-52	:	0	0	0	0	0	0	0	0	0	0	0
-50	:	0	0	0	0	0	0	0	0	0	0	0
-48	:	2	1	0	0	0	0	0	0	0	0	3
-46	:	1	0	0	0	0	0	0	0	0	0	1
-44	:	0	1	0	0	5	0	0	0	0	0	6
-42	:	2	0	0	0	2	0	0	0	0	0	4
-40	:	0	0	0	0	1	0	0	0	0	0	1
-38	:	0	1	0	0	0	0	0	0	0	0	1
-36	:	0	0	0	0	0	0	0	0	0	0	0
-34	:	0	0	0	0	0	0	0	0	0	0	0
-32	:	0	0	0	0	0	0	0	0	0	0	0
-30	:	0	0	0	0	0	0	0	0	0	0	0
-28	:	0	0	0	0	0	0	0	0	0	0	0
-26	:	0	0	0	0	0	0	0	0	0	0	0
-24	:	0	0	0	0	0	0	0	0	0	0	0
-22	:	0	0	0	0	0	0	0	0	0	0	0
-20	:	0	0	0	0	0	0	0	0	0	0	0
-18	:	0	0	0	0	0	0	0	0	0	0	0
-16	:	0	0	0	0	0	0	0	0	0	0	0
SUM		5	3	0	0	8	0	0	0	0	0	16

TOTAL NUMBER OF RECORDED ECHOES = 17

NUMBER OF ECHOES USED FOR STATISTICS = 16

AVERAGE BACKSCATTERING CROSS SECTION = .4901E-04 IN dB = -43.10

BACKSCATTERING CROSS SECTION STD DEV = .3593E-04

AVERAGE TARGET STRENGTH IN dB = -43.96

TARGET STRENGTH STD DEV IN dB = 2.74

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 16
ESTIMATED VOLUME IN CUBIC METERS = .255E+08
DENSITY IN FISH PER CUBIC METER = .627E-06

FILE NUMBER 1 = a:t32.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	1	0	0	0	0	0	0	0	0	0	1
-54	0	1	0	2	0	0	0	0	0	0	3
-52	2	0	0	2	0	0	0	0	0	0	4
-50	1	0	0	2	1	1	0	0	0	0	5
-48	0	1	0	5	0	1	0	0	0	0	7
-46	2	0	2	11	1	0	0	0	0	0	16
-44	2	1	1	12	1	1	0	0	0	0	18
-42	1	0	1	12	0	1	0	0	0	0	15
-40	0	2	4	8	0	0	0	0	0	0	14
-38	0	2	3	2	0	0	0	0	0	0	7
-36	1	0	2	4	1	0	0	0	0	0	8
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	1	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	2	0	0	0	0	0	0	0	2
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	10	7	16	61	4	4	0	0	0	0	102

TOTAL NUMBER OF RECORDED ECHOES = 137

NUMBER OF ECHOES USED FOR STATISTICS = 102

AVERAGE BACKSCATTERING CROSS SECTION = .1043E-03 IN dB = -39.82

BACKSCATTERING CROSS SECTION STD DEV = .2087E-03

AVERAGE TARGET STRENGTH IN dB = -43.18

TARGET STRENGTH STD DEV IN dB = 5.21

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 102
ESTIMATED VOLUME IN CUBIC METERS = .312E+08
DENSITY IN FISH PER CUBIC METER = .327E-05

FILE NUMBER 1 = art36a.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	1	0	0	0	0	0	0	0	0	0	1
-54	1	0	0	0	0	0	0	0	0	0	1
-52	1	1	0	0	0	0	0	0	0	0	2
-50	0	0	0	0	0	0	0	0	0	0	0
-48	1	0	0	0	0	0	0	0	0	0	1
-46	1	0	0	0	0	0	0	0	0	0	1
-44	0	0	0	0	0	0	0	0	0	0	0
-42	1	0	0	0	0	0	0	0	0	0	1
-40	1	0	0	0	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	7	1	0	0	0	0	0	0	0	0	8

TOTAL NUMBER OF RECORDED ECHOES = 9

NUMBER OF ECHOES USED FOR STATISTICS = 8

AVERAGE BACKSCATTERING CROSS SECTION = .2937E-04 IN dB = -45.32

BACKSCATTERING CROSS SECTION STD DEV = .3747E-04

AVERAGE TARGET STRENGTH IN dB = -48.72

TARGET STRENGTH STD DEV IN dB = 5.97

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 4

NUMBER OF FISH USED = 8
ESTIMATED VOLUME IN CUBIC METERS = .403E+07
DENSITY IN FISH PER CUBIC METER = .199E-05

FILE NUMBER 1 = a:t366.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	1	0	0	0	0	0	0	0	1
-62	0	0	0	0	0	0	0	0	0	0	0
-60	2	0	0	1	0	0	0	0	0	0	3
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	1	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	1	0	0	1	0	0	0	0	0	0	2
-50	1	0	0	0	0	0	0	0	0	0	1
-48	0	0	0	0	0	0	0	0	0	0	0
-46	2	0	1	0	0	0	0	0	0	0	3
-44	0	5	0	0	0	0	0	0	0	0	5
-42	0	2	0	1	0	0	0	0	0	0	3
-40	0	1	0	0	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	1	0	0	1	0	0	0	0	2
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	1	0	0	0	0	0	0	1
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	6	8	3	4	1	1	0	0	0	0	23

TOTAL NUMBER OF RECORDED ECHOES = 42

NUMBER OF ECHOES USED FOR STATISTICS = 23

AVERAGE BACKSCATTERING CROSS SECTION = .1583E-03 IN dB = -38.01

BACKSCATTERING CROSS SECTION STD DEV = .3891E-03

AVERAGE TARGET STRENGTH IN dB = -46.63

TARGET STRENGTH STD DEV IN dB = 9.48

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 23
ESTIMATED VOLUME IN CUBIC METERS = .232E+08
DENSITY IN FISH PER CUBIC METER = .990E-06

FILE NUMBER 1 = a:t36c.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	1	0	0	0	0	0	0	0	0	0	1
-62	1	0	1	1	0	0	0	0	0	0	3
-60	1	0	1	0	0	0	0	0	0	0	2
-58	0	0	0	0	0	0	0	0	0	0	0
-56	1	0	1	0	0	0	0	0	0	0	2
-54	0	0	1	0	0	0	0	0	0	0	1
-52	0	2	2	0	0	0	0	0	0	0	4
-50	1	1	1	0	0	0	0	0	0	0	3
-48	1	1	0	0	0	0	0	0	0	0	2
-46	3	0	0	0	0	0	0	0	0	0	3
-44	2	2	0	0	0	0	0	0	0	0	4
-42	0	4	0	1	0	0	0	0	0	0	5
-40	0	2	0	0	0	0	0	0	0	0	2
-38	0	0	0	0	0	1	0	0	0	0	1
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	11	13	7	2	0	1	0	0	0	0	34

TOTAL NUMBER OF RECORDED ECHOES = 66

NUMBER OF ECHOES USED FOR STATISTICS = 34

AVERAGE BACKSCATTERING CROSS SECTION = .3849E-04 IN dB = -44.15

BACKSCATTERING CROSS SECTION STD DEV = .5575E-04

AVERAGE TARGET STRENGTH IN dB = -49.07

TARGET STRENGTH STD DEV IN dB = 7.74

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 34
ESTIMATED VOLUME IN CUBIC METERS = .230E+08
DENSITY IN FISH PER CUBIC METER = .148E-05

FILE NUMBER 1 = a:t40.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	1	0	0	0	0	0	0	0	0	0	1
-62	1	2	0	0	0	0	0	0	0	0	3
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	1	0	0	0	0	0	0	0	0	1
-46	0	0	0	0	0	0	0	0	0	0	0
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	4	0	0	0	0	0	0	0	0	6

TOTAL NUMBER OF RECORDED ECHOES = 8

NUMBER OF ECHOES USED FOR STATISTICS = 6

AVERAGE BACKSCATTERING CROSS SECTION = .3828E-05 IN dB = -54.17

BACKSCATTERING CROSS SECTION STD DEV = .7634E-05

AVERAGE TARGET STRENGTH IN dB = -59.34

TARGET STRENGTH STD DEV IN dB = 6.20

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 6
ESTIMATED VOLUME IN CUBIC METERS = .100E+00
DENSITY IN FISH PER CUBIC METER = .598E-06

FILE NUMBER 1 = ait43.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	1	0	0	0	0	0	0	0	0	0	1
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	1	0	0	0	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	0	0	0	0	0	0	0	0	0
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	1	0	0	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	2	0	0	0	0	0	0	0	0	3

TOTAL NUMBER OF RECORDED ECHOES = 10

NUMBER OF ECHOES USED FOR STATISTICS = 3

AVERAGE BACKSCATTERING CROSS SECTION = .3358E-04 IN dB = -44.74

BACKSCATTERING CROSS SECTION STD DEV = .5753E-04

AVERAGE TARGET STRENGTH IN dB = -56.76

TARGET STRENGTH STD DEV IN dB = 14.75

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 3
ESTIMATED VOLUME IN CUBIC METERS = .134E+08
DENSITY IN FISH PER CUBIC METER = .223E-06

FILE NUMBER 1 = a:t44.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	1	0	0	0	0	0	0	0	1
-62	0	0	0	0	0	0	0	0	0	0	0
-60	1	0	0	0	0	0	0	0	0	0	1
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	1	0	0	0	0	0	0	0	1
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	0	0	0	0	0	0	0	0	0
-44	0	1	0	0	0	0	0	0	0	0	1
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	2	2	0	0	0	0	0	0	0	5

TOTAL NUMBER OF RECORDED ECHOES = 17

NUMBER OF ECHOES USED FOR STATISTICS = 5

AVERAGE BACKSCATTERING CROSS SECTION = .5036E-04 IN dB = -42.34

BACKSCATTERING CROSS SECTION STD DEV = .1011E-03

AVERAGE TARGET STRENGTH IN dB = -50.85

TARGET STRENGTH STD DEV IN dB = 11.18

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 5
ESTIMATED VOLUME IN CUBIC METERS = .219E+00
DENSITY IN FISH PER CUBIC METER = .229E-06

```
FILE NUMBER  1 = a:t45.001
NO TARGETS FOUND

-------------------------------------------------------------------------------

SUMMARY OF DATA FROM DEPTH     .0 TO  76.2
 NO TARGETS FOUND
```

```
FILE NUMBER  1 = a:t46.001
NO TARGETS FOUND

-------------------------------------------------------------------------------

SUMMARY OF DATA FROM DEPTH     .0 TO  76.2
 NO TARGETS FOUND
```

FILE NUMBER 1 = a:t47.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	1	3	0	0	0	0	0	0	0	4
-52	0	3	1	0	0	0	0	0	0	0	4
-50	0	3	0	1	0	0	0	0	0	0	4
-48	0	2	2	1	0	0	0	0	0	0	5
-46	1	4	3	1	0	0	0	0	0	0	9
-44	3	3	1	1	0	0	0	0	0	0	8
-42	2	0	1	2	0	0	0	0	0	0	5
-40	1	2	1	2	0	0	0	0	0	0	6
-38	2	0	1	1	0	0	0	0	0	0	4
-36	1	0	0	1	0	0	0	0	0	0	2
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	1	0	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	10	20	13	10	0	0	0	0	0	0	53

TOTAL NUMBER OF RECORDED ECHOES = 69

NUMBER OF ECHOES USED FOR STATISTICS = 53

AVERAGE BACKSCATTERING CROSS SECTION = .6268E-04 IN dB = -42.03

BACKSCATTERING CROSS SECTION STD DEV = .9456E-04

AVERAGE TARGET STRENGTH IN dB = -45.12

TARGET STRENGTH STD DEV IN dB = 5.40

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 53
ESTIMATED VOLUME IN CUBIC METERS = .128E+08
DENSITY IN FISH PER CUBIC METER = .414E-05

FILE NUMBER 1 = a:t40.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	1	0	0	0	0	0	0	0	0	0	1
-58	1	0	0	0	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	1	0	0	0	0	0	0	0	0	0	1
-50	2	1	0	0	0	0	0	0	0	0	3
-48	0	4	3	1	0	0	0	0	0	0	8
-46	0	3	1	1	0	0	0	0	0	0	5
-44	1	3	1	3	0	0	0	0	0	0	8
-42	0	2	2	1	0	0	0	0	0	0	5
-40	0	0	2	0	0	0	0	0	0	0	2
-38	0	0	2	1	0	0	0	0	0	0	3
-36	0	0	0	1	0	0	0	0	0	0	1
-34	0	0	0	2	0	0	0	0	0	0	2
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	6	13	11	10	0	0	0	0	0	0	40

TOTAL NUMBER OF RECORDED ECHOES = 58

NUMBER OF ECHOES USED FOR STATISTICS = 40

AVERAGE BACKSCATTERING CROSS SECTION = .6371E-04 IN dB = -41.96

BACKSCATTERING CROSS SECTION STD DEV = .8455E-04

AVERAGE TARGET STRENGTH IN dB = -44.86

TARGET STRENGTH STD DEV IN dB = 5.41

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 40
ESTIMATED VOLUME IN CUBIC METERS = .383E+07
DENSITY IN FISH PER CUBIC METER = .104E-04

FILE NUMBER 1 = act49.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	1	0	0	0	0	0	0	0	0	1
-54	0	1	1	0	0	0	0	0	0	0	2
-52	1	0	3	0	0	0	0	0	0	0	4
-50	1	1	2	2	0	0	0	0	0	0	6
-48	3	1	5	3	0	0	0	0	0	0	12
-46	1	3	6	5	0	0	0	0	0	0	15
-44	1	3	7	1	0	0	0	0	0	0	12
-42	0	4	13	7	0	0	0	0	0	0	24
-40	0	5	11	5	0	0	0	0	0	0	21
-38	0	5	7	2	0	0	0	0	0	0	14
-36	0	0	9	4	0	0	0	0	0	0	13
-34	0	1	6	0	0	0	0	0	0	0	7
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	7	25	70	29	0	0	0	0	0	0	131

TOTAL NUMBER OF RECORDED ECHOES = 180

NUMBER OF ECHOES USED FOR STATISTICS = 131

AVERAGE BACKSCATTERING CROSS SECTION = .9818E-04 IN dB = -40.08

BACKSCATTERING CROSS SECTION STD DEV = .9929E-04

AVERAGE TARGET STRENGTH IN dB = -42.39

TARGET STRENGTH STD DEV IN dB = 4.89

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 131
ESTIMATED VOLUME IN CUBIC METERS = .533E+07
DENSITY IN FISH PER CUBIC METER = .246E-04

FILE NUMBER 1 = a:t50.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	1	0	0	0	0	0	1
-58	0	0	1	0	0	0	0	0	0	0	1
-56	0	1	0	0	0	0	0	0	0	0	1
-54	0	0	1	0	1	0	0	0	0	0	2
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	2	1	0	0	0	0	0	0	0	3
-48	0	5	3	0	0	0	0	0	0	0	8
-46	0	4	2	0	1	0	0	0	0	0	7
-44	0	5	2	1	0	0	0	0	0	0	8
-42	0	2	3	1	0	0	0	0	0	0	6
-40	0	1	3	1	0	0	0	0	0	0	5
-38	0	1	0	1	0	0	0	0	0	0	2
-36	0	0	1	2	0	0	0	0	0	0	3
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	21	17	6	3	0	0	0	0	0	47

TOTAL NUMBER OF RECORDED ECHOES = 61

NUMBER OF ECHOES USED FOR STATISTICS = 47

AVERAGE BACKSCATTERING CROSS SECTION = .5579E-04 IN dB = -42.54

BACKSCATTERING CROSS SECTION STD DEV = .6604E-04

AVERAGE TARGET STRENGTH IN dB = -45.19

TARGET STRENGTH STD DEV IN dB = 5.31

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 47
ESTIMATED VOLUME IN CUBIC METERS = .253E+07
DENSITY IN FISH PER CUBIC METER = .186E-04

FILE NUMBER 1 = a:t51.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	1	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	1	0	0	0	0	0	0	0	0	1
-50	0	0	0	0	0	0	0	0	0	0	0
-48	1	1	1	1	0	0	0	0	0	0	4
-46	1	1	1	1	0	0	0	0	0	0	4
-44	0	0	2	1	0	0	0	0	0	0	3
-42	0	2	0	1	2	0	0	0	0	0	5
-40	2	0	2	1	2	0	0	0	0	0	7
-38	0	1	0	1	2	1	0	0	0	0	5
-36	0	0	3	0	0	0	0	0	0	0	3
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	1	0	0	1	0	0	0	0	2
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	4	6	10	7	6	2	0	0	0	0	35

TOTAL NUMBER OF RECORDED ECHOES = 48

NUMBER OF ECHOES USED FOR STATISTICS = 35

AVERAGE BACKSCATTERING CROSS SECTION = .1232E-03 IN dB = -39.09

BACKSCATTERING CROSS SECTION STD DEV = .1675E-03

AVERAGE TARGET STRENGTH IN dB = -41.98

TARGET STRENGTH STD DEV IN dB = 5.38

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 35
ESTIMATED VOLUME IN CUBIC METERS = .447E+07
DENSITY IN FISH PER CUBIC METER = .782E-05

FILE NUMBER 1 = a:t52.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	1	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	1	0	0	0	0	0	0	0	1
-48	0	0	1	0	0	0	0	0	0	0	1
-46	0	0	0	1	0	0	0	0	0	0	1
-44	1	0	5	1	0	0	0	0	0	0	7
-42	0	0	1	0	0	0	0	0	0	0	1
-40	0	1	2	0	0	0	0	0	0	0	3
-38	0	0	0	1	0	0	0	0	0	0	1
-36	0	0	0	2	0	0	0	0	0	0	2
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	1	12	5	0	0	0	0	0	0	19

TOTAL NUMBER OF RECORDED ECHOES = 32

NUMBER OF ECHOES USED FOR STATISTICS = 19

AVERAGE BACKSCATTERING CROSS SECTION = .9489E-04 IN dB = -40.23

BACKSCATTERING CROSS SECTION STD DEV = .1061E-03

AVERAGE TARGET STRENGTH IN dB = -42.87

TARGET STRENGTH STD DEV IN dB = 5.50

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 19
ESTIMATED VOLUME IN CUBIC METERS = .263E+07
DENSITY IN FISH PER CUBIC METER = .722E-05

FILE NUMBER 1 = a:t53.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	1	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	1	0	0	0	0	1
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	1	0	2	0	0	0	0	0	0	3
-48	0	3	0	0	0	2	0	0	0	0	5
-46	0	1	1	3	0	1	0	0	0	0	6
-44	1	1	0	2	2	0	0	0	0	0	6
-42	0	4	0	1	0	0	0	0	0	0	5
-40	0	2	2	1	0	0	0	0	0	0	5
-38	0	5	0	2	2	0	0	0	0	0	9
-36	0	3	0	1	0	0	0	0	0	0	4
-34	0	1	0	0	0	0	0	0	0	0	1
-32	0	1	0	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	22	4	12	4	4	0	0	0	0	47

TOTAL NUMBER OF RECORDED ECHOES = 60

NUMBER OF ECHOES USED FOR STATISTICS = 47

AVERAGE BACKSCATTERING CROSS SECTION = .1062E-03 IN dB = -39.74

BACKSCATTERING CROSS SECTION STD DEV = .1326E-03

AVERAGE TARGET STRENGTH IN dB = -42.58

TARGET STRENGTH STD DEV IN dB = 5.39

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 2

NUMBER OF FISH USED = 47
ESTIMATED VOLUME IN CUBIC METERS = .479E+07
DENSITY IN FISH PER CUBIC METER = .981E-05

FILE NUMBER 1 = a:t54.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	1	0	0	0	0	1
-58	0	0	0	0	0	0	0	1	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	1	0	0	0	0	0	0	0	1
-52	0	1	0	1	1	0	0	1	0	0	4
-50	0	0	0	1	1	0	0	0	0	0	2
-48	0	0	1	0	1	0	0	2	0	0	4
-46	0	0	4	1	1	3	0	2	0	0	11
-44	0	0	2	0	0	0	0	0	0	0	2
-42	0	0	1	1	0	0	0	0	0	0	2
-40	0	0	2	0	1	0	0	0	0	0	3
-38	0	1	2	2	0	0	0	0	0	0	5
-36	0	0	0	1	0	0	0	0	0	0	1
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	2	14	7	5	4	0	6	0	0	38

TOTAL NUMBER OF RECORDED ECHOES = 52

NUMBER OF ECHOES USED FOR STATISTICS = 38

AVERAGE BACKSCATTERING CROSS SECTION = .6319E-04 IN dB = -41.99

BACKSCATTERING CROSS SECTION STD DEV = .8506E-04

AVERAGE TARGET STRENGTH IN dB = -45.57

TARGET STRENGTH STD DEV IN dB = 6.04

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 38
ESTIMATED VOLUME IN CUBIC METERS = .151E+07
DENSITY IN FISH PER CUBIC METER = .252E-04

FILE NUMBER 1 = a:t55.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	1	1	0	1	0	0	0	0	0	0	3
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	1	0	0	0	0	0	0	1
-50	0	1	0	1	1	0	0	0	0	0	3
-48	0	1	1	0	1	0	0	0	0	0	3
-46	1	2	2	1	1	0	0	0	0	0	7
-44	0	1	0	1	1	0	0	0	0	0	3
-42	0	2	1	2	0	0	0	0	0	0	5
-40	0	2	2	3	4	0	0	0	0	0	11
-38	0	0	0	0	2	0	0	0	0	0	2
-36	0	0	0	1	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	10	6	11	10	0	0	0	0	0	39

TOTAL NUMBER OF RECORDED ECHOES = 55

NUMBER OF ECHOES USED FOR STATISTICS = 39

AVERAGE BACKSCATTERING CROSS SECTION = .5899E-04 IN dB = -42.29

BACKSCATTERING CROSS SECTION STD DEV = .4929E-04

AVERAGE TARGET STRENGTH IN dB = -44.58

TARGET STRENGTH STD DEV IN dB = 5.50

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 39
ESTIMATED VOLUME IN CUBIC METERS = .360E+07
DENSITY IN FISH PER CUBIC METER = .108E-04

FILE NUMBER 1 = a:t56.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	1	0	0	0	0	0	0	0	0	1
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	1	0	0	0	0	0	0	0	0	1
-52	0	0	1	0	0	0	0	0	0	0	1
-50	0	0	1	0	3	0	0	0	0	0	4
-48	0	0	3	1	0	0	0	0	0	0	4
-46	1	3	4	0	0	0	0	0	0	0	8
-44	0	0	3	0	0	0	0	0	0	0	3
-42	0	0	1	0	0	0	0	0	0	0	1
-40	0	0	4	1	0	0	0	0	0	0	5
-38	0	0	1	1	0	0	0	0	0	0	2
-36	0	0	4	2	0	0	0	0	0	0	6
-34	0	1	1	0	0	0	0	0	0	0	2
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	1	0	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	6	24	5	3	0	0	0	0	0	39

TOTAL NUMBER OF RECORDED ECHOES = 59

NUMBER OF ECHOES USED FOR STATISTICS = 39

AVERAGE BACKSCATTERING CROSS SECTION = .1163E-03 IN dB = -39.35

BACKSCATTERING CROSS SECTION STD DEV = .1754E-03

AVERAGE TARGET STRENGTH IN dB = -40.51

TARGET STRENGTH STD DEV IN dB = 6.51

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 39
ESTIMATED VOLUME IN CUBIC METERS = .576E+07
DENSITY IN FISH PER CUBIC METER = .677E-05

FILE NUMBER 1 = a:t58.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	1	1	0	0	0	0	0	0	0	2
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	2	0	0	0	0	0	0	2
-50	0	0	0	1	0	0	0	0	0	0	1
-48	0	0	1	1	0	0	0	0	0	0	2
-46	0	0	0	0	0	0	0	0	0	0	0
-44	0	2	0	1	0	0	0	0	0	0	3
-42	0	0	1	0	1	0	0	0	0	0	2
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	2	1	0	0	0	0	0	0	3
-36	0	0	1	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	1	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	3	7	6	1	0	0	0	0	0	17

TOTAL NUMBER OF RECORDED ECHOES = 29

NUMBER OF ECHOES USED FOR STATISTICS = 17

AVERAGE BACKSCATTERING CROSS SECTION = .9507E-04 IN dB = -40.22

BACKSCATTERING CROSS SECTION STD DEV = .1407E-03

AVERAGE TARGET STRENGTH IN dB = -44.57

TARGET STRENGTH STD DEV IN dB = 6.95

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 17
ESTIMATED VOLUME IN CUBIC METERS = .278E+07
DENSITY IN FISH PER CUBIC METER = .612E-05

FILE NUMBER 1 = a:t60.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	1	0	1	0	0	0	0	0	0	0	2
-52	1	0	0	0	0	0	0	0	0	0	1
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	2	2	1	0	0	0	0	0	0	0	5
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	3	0	0	0	0	0	0	0	3
-40	1	0	1	0	0	0	0	0	0	0	2
-38	0	0	0	1	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	5	2	6	1	0	0	0	0	0	0	14

TOTAL NUMBER OF RECORDED ECHOES = 20

NUMBER OF ECHOES USED FOR STATISTICS = 14

AVERAGE BACKSCATTERING CROSS SECTION = .4528E-04 IN dB = -43.44

BACKSCATTERING CROSS SECTION STD DEV = .3866E-04

AVERAGE TARGET STRENGTH IN dB = -45.46

TARGET STRENGTH STD DEV IN dB = 4.91

* ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 2

NUMBER OF FISH USED = 14
ESTIMATED VOLUME IN CUBIC METERS = .455E+07
DENSITY IN FISH PER CUBIC METER = .308E-05

FILE NUMBER 1 = a:t62.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	1	3	1	0	0	0	0	0	0	0	5
-44	0	1	0	0	0	0	0	0	0	0	1
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	1	1	1	0	0	0	0	0	0	3
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	1	1	2	0	0	0	0	0	0	4
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	6	3	3	0	0	0	0	0	0	13

TOTAL NUMBER OF RECORDED ECHOES = 28

NUMBER OF ECHOES USED FOR STATISTICS = 13

AVERAGE BACKSCATTERING CROSS SECTION = .1173E-03 IN dB = -39.31

BACKSCATTERING CROSS SECTION STD DEV = .1055E-03

AVERAGE TARGET STRENGTH IN dB = -41.33

TARGET STRENGTH STD DEV IN dB = 4.57

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 13
ESTIMATED VOLUME IN CUBIC METERS = .474E+07
DENSITY IN FISH PER CUBIC METER = .274E-05

FILE NUMBER 1 = a:t64.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	1	0	0	0	0	0	0	1
-56	0	0	1	0	0	0	0	0	0	0	1
-54	1	0	0	0	0	0	0	0	0	0	1
-52	0	0	1	1	1	0	0	0	0	0	3
-50	1	0	0	2	0	0	0	0	0	0	3
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	0	1	0	0	0	0	0	0	1
-44	1	0	1	1	0	0	0	0	0	0	3
-42	0	0	0	0	1	0	0	0	0	0	1
-40	0	1	1	2	0	0	0	0	0	0	4
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	0	1	0	1	0	0	0	0	0	2
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	3	1	6	8	3	0	0	0	0	0	21

TOTAL NUMBER OF RECORDED ECHOES = 34

NUMBER OF ECHOES USED FOR STATISTICS = 21

AVERAGE BACKSCATTERING CROSS SECTION = .6280E-04 IN dB = -42.02

BACKSCATTERING CROSS SECTION STD DEV = .7160E-04

AVERAGE TARGET STRENGTH IN dB = -45.87

TARGET STRENGTH STD DEV IN dB = 6.74

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 21
ESTIMATED VOLUME IN CUBIC METERS = .738E+07
DENSITY IN FISH PER CUBIC METER = .285E-05

FILE NUMBER 1 = a:t66.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	1	1	0	0	0	0	0	0	0	0	2
-50	0	0	0	0	0	0	0	2	0	0	2
-48	0	2	1	0	0	0	0	0	0	0	3
-46	0	0	1	0	0	0	0	0	0	0	1
-44	0	1	1	0	0	0	0	0	0	0	2
-42	1	1	4	0	0	0	0	0	0	0	6
-40	0	1	4	0	0	0	0	0	0	0	5
-38	0	2	0	0	0	0	0	0	0	0	2
-36	0	1	1	0	0	0	0	0	0	0	2
-34	0	1	1	0	0	0	0	0	0	0	2
-32	0	1	0	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	11	13	0	0	0	0	2	0	0	28

TOTAL NUMBER OF RECORDED ECHOES = 45

NUMBER OF ECHOES USED FOR STATISTICS = 28

AVERAGE BACKSCATTERING CROSS SECTION = .1146E-03 IN dB = -39.41

BACKSCATTERING CROSS SECTION STD DEV = .1380E-03

AVERAGE TARGET STRENGTH IN dB = -42.38

TARGET STRENGTH STD DEV IN dB = 5.53

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 28
ESTIMATED VOLUME IN CUBIC METERS = .587E+07
DENSITY IN FISH PER CUBIC METER = .477E-05

FILE NUMBER 1 = a:t68.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	1	0	0	0	0	1
-54	0	1	0	0	0	1	0	0	0	0	2
-52	1	0	0	0	0	1	0	0	0	0	2
-50	1	1	0	0	0	1	0	0	0	0	3
-48	0	0	0	0	0	2	0	0	0	0	2
-46	1	0	0	0	0	0	0	0	0	0	1
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	1	0	0	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	3	3	0	0	0	6	0	0	0	0	12

TOTAL NUMBER OF RECORDED ECHOES = 16

NUMBER OF ECHOES USED FOR STATISTICS = 12

AVERAGE BACKSCATTERING CROSS SECTION = .1742E-04 IN dB = -47.59

BACKSCATTERING CROSS SECTION STD DEV = .2611E-04

AVERAGE TARGET STRENGTH IN dB = -50.06

TARGET STRENGTH STD DEV IN dB = 4.36

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 12
ESTIMATED VOLUME IN CUBIC METERS = .106E+08
DENSITY IN FISH PER CUBIC METER = .113E-05

FILE NUMBER 1 = a:t69.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	2	0	0	0	0	0	0	0	0	0	2
-50	0	0	0	0	0	0	0	0	0	0	0
-48	1	0	0	0	0	0	0	0	0	0	1
-46	0	0	0	0	0	0	0	0	0	0	0
-44	2	0	0	0	0	0	0	0	0	0	2
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	2	0	0	0	0	1	0	0	3
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	1	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	5	0	2	0	0	0	0	1	1	0	9

TOTAL NUMBER OF RECORDED ECHOES = 14

NUMBER OF ECHOES USED FOR STATISTICS = 9

AVERAGE BACKSCATTERING CROSS SECTION = .1946E-03 IN dB = -37.11

BACKSCATTERING CROSS SECTION STD DEV = .2775E-03

AVERAGE TARGET STRENGTH IN dB = -42.29

TARGET STRENGTH STD DEV IN dB = 8.10

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 9
ESTIMATED VOLUME IN CUBIC METERS = .975E+07
DENSITY IN FISH PER CUBIC METER = .923E-06

6.4.2 - Appendix D2 - September 1988

FILE NUMBER 1 = a:2-t10.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	1	0	0	0	0	0	0	1
-54	0	1	2	0	0	0	0	0	0	0	3
-52	0	0	0	1	0	0	0	0	0	0	1
-50	2	1	1	1	0	0	0	0	0	0	5
-48	0	3	0	2	0	0	0	0	0	0	5
-46	0	1	1	0	0	0	0	0	0	0	2
-44	0	4	2	1	0	0	0	0	0	0	7
-42	0	4	6	1	0	0	0	0	0	0	11
-40	0	2	4	3	0	0	0	0	0	0	9
-38	0	1	2	1	0	0	0	0	0	0	4
-36	0	1	1	0	0	0	0	0	0	0	2
-34	0	1	0	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	1	0	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	19	20	11	0	0	0	0	0	0	52

TOTAL NUMBER OF RECORDED ECHOES = 75

NUMBER OF ECHOES USED FOR STATISTICS = 52

AVERAGE BACKSCATTERING CROSS SECTION = .8436E-04 IN dB = -40.74

BACKSCATTERING CROSS SECTION STD DEV = .1286E-03

AVERAGE TARGET STRENGTH IN dB = -43.76

TARGET STRENGTH STD DEV IN dB = 5.45

ECHOES WITH BEAM PATTERN FACTORS ; 0 dB= 2

NUMBER OF FISH USED = 52
ESTIMATED VOLUME IN CUBIC METERS = .500E+07
DENSITY IN FISH PER CUBIC METER = .104E-04

FILE NUMBER 1 = a:2-t12.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	1	0	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	1	1	0	0	0	0	0	0	0	2
-50	1	0	1	0	0	0	0	0	0	0	2
-48	0	1	2	0	0	0	0	0	0	0	3
-46	0	1	1	0	0	0	0	0	0	0	2
-44	0	2	0	0	0	0	0	0	0	0	2
-42	1	3	2	1	0	0	0	0	0	0	7
-40	0	5	1	0	0	0	0	0	0	0	6
-38	0	0	1	1	0	0	0	0	0	0	2
-36	0	1	1	0	0	0	0	0	0	0	2
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	16	10	2	0	0	0	0	0	0	30

TOTAL NUMBER OF RECORDED ECHOES = 40

NUMBER OF ECHOES USED FOR STATISTICS = 30

AVERAGE BACKSCATTERING CROSS SECTION = .6625E-04 IN dB = -41.79

BACKSCATTERING CROSS SECTION STD DEV = .5692E-04

AVERAGE TARGET STRENGTH IN dB = -44.11

TARGET STRENGTH STD DEV IN dB = 5.46

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 30
ESTIMATED VOLUME IN CUBIC METERS = .115E+07
DENSITY IN FISH PER CUBIC METER = .261E-04

FILE NUMBER 1 = a:2-t13.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	1	0	0	0	0	0	0	0	0	1
-54	0	2	1	0	0	0	0	0	0	0	3
-52	0	1	2	0	0	0	0	0	0	0	3
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	1	0	0	0	0	0	0	0	1
-46	0	4	2	0	0	0	0	0	0	0	6
-44	0	2	0	0	0	0	0	0	0	0	2
-42	0	2	0	0	0	0	0	0	0	0	2
-40	0	2	1	0	0	0	0	0	0	0	3
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	1	0	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	15	7	0	0	0	0	0	0	0	22

TOTAL NUMBER OF RECORDED ECHOES = 26

NUMBER OF ECHOES USED FOR STATISTICS = 22

AVERAGE BACKSCATTERING CROSS SECTION = .5031E-04 IN dB = -42.98

BACKSCATTERING CROSS SECTION STD DEV = .8836E-04

AVERAGE TARGET STRENGTH IN dB = -46.68

TARGET STRENGTH STD DEV IN dB = 5.87

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 22
ESTIMATED VOLUME IN CUBIC METERS = .482E+07
DENSITY IN FISH PER CUBIC METER = .456E-05

FILE NUMBER 1 = a:2-t14.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	1	0	0	0	0	0	0	0	1
-56	0	1	1	0	0	0	0	0	0	0	2
-54	0	0	3	0	0	0	0	0	0	0	3
-52	0	2	1	0	0	0	0	0	0	0	3
-50	0	1	0	0	0	0	0	0	0	0	1
-48	0	3	1	0	0	0	0	0	0	0	4
-46	1	6	2	0	0	0	0	0	0	0	9
-44	0	6	1	1	0	0	0	0	0	0	8
-42	0	5	4	3	0	0	0	0	0	0	12
-40	0	5	5	0	0	0	0	0	0	0	10
-38	0	2	1	0	0	0	0	0	0	0	3
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	1	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	31	20	5	0	0	0	0	0	0	57

TOTAL NUMBER OF RECORDED ECHOES = 77

NUMBER OF ECHOES USED FOR STATISTICS = 57

AVERAGE BACKSCATTERING CROSS SECTION = .5568E-04 IN dB = -42.54

BACKSCATTERING CROSS SECTION STD DEV = .5842E-04

AVERAGE TARGET STRENGTH IN dB = -44.79

TARGET STRENGTH STD DEV IN dB = 5.11

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 57
ESTIMATED VOLUME IN CUBIC METERS = .619E+07
DENSITY IN FISH PER CUBIC METER = .921E-05

FILE NUMBER 1 = a:2-t15.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	1	0	0	0	0	0	0	0	0	1
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	2	1	0	0	0	0	0	0	0	3
-52	0	3	3	0	0	0	0	0	0	0	6
-50	0	3	5	0	0	0	0	0	0	0	8
-48	2	4	1	0	0	0	0	0	0	0	7
-46	1	6	5	0	0	0	0	0	0	0	12
-44	2	3	7	0	0	0	0	0	0	0	12
-42	0	5	5	0	0	0	0	0	0	0	10
-40	1	4	4	0	0	0	0	0	0	0	9
-38	0	1	2	0	0	0	0	0	0	0	3
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	1	0	0	0	0	0	0	1
-30	0	0	0	1	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	6	34	34	2	0	0	0	0	0	0	76

TOTAL NUMBER OF RECORDED ECHOES = 98

NUMBER OF ECHOES USED FOR STATISTICS = 76

AVERAGE BACKSCATTERING CROSS SECTION = .6947E-04 IN dB = -41.58

BACKSCATTERING CROSS SECTION STD DEV = .1444E-03

AVERAGE TARGET STRENGTH IN dB = -45.27

TARGET STRENGTH STD DEV IN dB = 5.62

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 76
ESTIMATED VOLUME IN CUBIC METERS = .612E+07
DENSITY IN FISH PER CUBIC METER = .124E-04

FILE NUMBER 1 = a:2-t16.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	1	0	0	0	0	0	0	0	1
-54	1	1	6	1	0	0	0	0	0	0	9
-52	1	5	6	1	0	0	0	0	0	0	13
-50	1	3	11	1	0	0	0	0	0	0	16
-48	0	4	10	1	0	0	0	0	0	0	15
-46	0	6	9	0	0	0	0	0	0	0	15
-44	1	13	10	1	0	0	0	0	0	0	25
-42	1	4	11	2	0	0	0	0	0	0	18
-40	2	8	7	0	0	0	0	0	0	0	17
-38	1	1	14	2	0	0	0	0	0	0	18
-36	0	0	3	1	0	0	0	0	0	0	4
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	1	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	8	45	89	10	0	0	0	0	0	0	152

TOTAL NUMBER OF RECORDED ECHOES = 212

NUMBER OF ECHOES USED FOR STATISTICS = 152

AVERAGE BACKSCATTERING CROSS SECTION = .6009E-04 IN dB = -42.21

BACKSCATTERING CROSS SECTION STD DEV = .6889E-04

AVERAGE TARGET STRENGTH IN dB = -44.83

TARGET STRENGTH STD DEV IN dB = 5.13

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 4

NUMBER OF FISH USED = 152
ESTIMATED VOLUME IN CUBIC METERS = .108E+08
DENSITY IN FISH PER CUBIC METER = .141E-04

FILE NUMBER 1 = a:2-t17.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	1	0	0	0	0	0	0	0	0	1
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	1	0	0	0	0	0	0	0	0	1
-52	0	1	0	0	0	0	0	0	0	0	1
-50	0	2	3	0	0	0	0	0	0	0	5
-48	0	2	2	0	0	0	0	0	0	0	4
-46	0	5	4	0	0	0	0	0	0	0	9
-44	0	1	5	1	0	0	0	0	0	0	7
-42	0	3	2	0	0	0	0	0	0	0	5
-40	0	3	1	0	0	0	0	0	0	0	4
-38	0	0	1	1	0	0	0	0	0	0	2
-36	0	0	0	2	0	0	0	0	0	0	2
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	20	18	4	0	0	0	0	0	0	42

TOTAL NUMBER OF RECORDED ECHOES = 62

NUMBER OF ECHOES USED FOR STATISTICS = 42

AVERAGE BACKSCATTERING CROSS SECTION = .5262E-04 IN dB = -42.79

BACKSCATTERING CROSS SECTION STD DEV = .6310E-04

AVERAGE TARGET STRENGTH IN dB = -45.33

TARGET STRENGTH STD DEV IN dB = 5.19

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 42
ESTIMATED VOLUME IN CUBIC METERS = .939E+07
DENSITY IN FISH PER CUBIC METER = .448E-05

FILE NUMBER 1 = a:2-t18.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	1	0	0	0	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	1	0	0	0	0	0	0	0	1
-56	0	0	1	0	0	1	0	0	0	0	2
-54	0	1	2	0	0	0	1	0	0	0	4
-52	0	2	0	0	0	0	0	0	0	0	2
-50	0	3	4	0	0	1	0	0	0	0	8
-48	1	4	15	1	0	2	0	0	0	0	23
-46	0	9	12	1	0	1	0	0	0	0	23
-44	1	18	16	2	0	0	0	0	0	0	37
-42	1	18	25	1	0	0	0	0	0	0	45
-40	1	18	12	0	0	0	0	0	0	0	31
-38	0	10	7	1	0	0	0	0	0	0	18
-36	0	3	2	1	0	0	0	0	0	0	6
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	4	87	97	7	0	5	1	0	0	0	201

TOTAL NUMBER OF RECORDED ECHOES = 278

NUMBER OF ECHOES USED FOR STATISTICS = 201

AVERAGE BACKSCATTERING CROSS SECTION = .6352E-04 IN dB = -41.97

BACKSCATTERING CROSS SECTION STD DEV = .5327E-04

AVERAGE TARGET STRENGTH IN dB = -43.64

TARGET STRENGTH STD DEV IN dB = 4.29

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 201
ESTIMATED VOLUME IN CUBIC METERS = .148E+08
DENSITY IN FISH PER CUBIC METER = .135E-04

FILE NUMBER 1 = a:2-t19.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	1	0	0	0	0	0	0	0	0	0	1
-58	1	1	1	0	0	0	0	0	0	0	3
-56	0	1	0	0	0	0	0	0	0	0	1
-54	0	1	0	1	0	0	0	0	0	0	2
-52	0	2	0	0	0	0	0	0	0	0	2
-50	0	0	1	0	0	0	0	0	0	0	1
-48	0	6	1	1	0	0	0	0	0	0	8
-46	0	5	2	3	0	0	0	0	0	0	10
-44	1	5	4	5	0	0	0	0	0	0	15
-42	1	8	8	2	0	0	0	0	0	0	19
-40	0	4	4	0	0	0	0	0	0	0	8
-38	0	3	7	1	0	0	0	0	0	0	11
-36	0	1	2	0	0	0	0	0	0	0	3
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	1	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	4	37	31	13	0	0	1	0	0	0	86

TOTAL NUMBER OF RECORDED ECHOES = 121

NUMBER OF ECHOES USED FOR STATISTICS = 86

AVERAGE BACKSCATTERING CROSS SECTION = .7540E-04 IN dB = -41.23

BACKSCATTERING CROSS SECTION STD DEV = .9410E-04

AVERAGE TARGET STRENGTH IN dB = -43.78

TARGET STRENGTH STD DEV IN dB = 5.36

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 86
ESTIMATED VOLUME IN CUBIC METERS = .117E+08
DENSITY IN FISH PER CUBIC METER = .736E-05

FILE NUMBER 1 = a:2-t21.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	1	0	0	0	0	0	0	0	1
-58	0	2	2	0	0	0	0	0	0	0	4
-56	0	3	1	2	0	0	0	0	0	0	6
-54	0	5	0	0	1	0	0	0	0	0	6
-52	0	2	5	0	0	0	0	0	0	0	7
-50	1	4	6	1	1	0	0	0	0	0	13
-48	0	7	8	0	1	0	0	0	0	0	16
-46	3	21	9	0	0	0	0	0	0	0	33
-44	3	24	20	2	0	0	0	0	0	0	49
-42	2	38	14	3	0	0	0	0	0	0	57
-40	1	24	9	1	0	0	0	0	0	0	35
-38	0	19	3	2	0	0	0	0	0	0	24
-36	0	5	2	0	0	0	0	0	0	0	7
-34	0	1	0	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	10	155	80	11	3	0	0	0	0	0	259

TOTAL NUMBER OF RECORDED ECHOES = 364

NUMBER OF ECHOES USED FOR STATISTICS = 259

AVERAGE BACKSCATTERING CROSS SECTION = .6157E-04 IN dB = -42.11

BACKSCATTERING CROSS SECTION STD DEV = .5428E-04

AVERAGE TARGET STRENGTH IN dB = -44.06

TARGET STRENGTH STD DEV IN dB = 4.78

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 9

NUMBER OF FISH USED = 259
ESTIMATED VOLUME IN CUBIC METERS = .223E+08
DENSITY IN FISH PER CUBIC METER = .116E-04

FILE NUMBER 1 = a:2-t231.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	2	1	1	2	0	0	0	0	0	6
-56	0	1	0	0	0	0	1	0	0	0	2
-54	0	10	4	1	0	0	2	0	0	0	17
-52	1	7	6	0	0	1	0	0	0	0	15
-50	4	11	7	1	2	0	0	0	0	0	25
-48	0	21	5	3	0	0	0	0	0	0	29
-46	1	12	24	5	1	0	0	0	0	0	43
-44	1	17	15	2	1	0	0	0	0	0	36
-42	4	9	24	3	2	0	0	0	0	0	42
-40	2	14	16	3	4	0	0	0	0	0	39
-38	1	4	8	1	0	0	0	0	0	0	14
-36	0	3	5	3	1	0	0	0	0	0	12
-34	0	0	3	0	0	0	0	0	0	0	3
-32	0	0	2	0	0	1	0	0	0	0	3
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	14	111	120	23	13	2	3	0	0	0	286

TOTAL NUMBER OF RECORDED ECHOES = 399

NUMBER OF ECHOES USED FOR STATISTICS = 286

AVERAGE BACKSCATTERING CROSS SECTION = .6377E-04 IN dB = -41.95

BACKSCATTERING CROSS SECTION STD DEV = .8883E-04

AVERAGE TARGET STRENGTH IN dB = -44.92

TARGET STRENGTH STD DEV IN dB = 5.36

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 15

NUMBER OF FISH USED = 286
ESTIMATED VOLUME IN CUBIC METERS = .225E+08
DENSITY IN FISH PER CUBIC METER = .127E-04

FILE NUMBER 1 = a:2-t232.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	2	2	0	0	0	0	0	0	0	4
-56	0	1	3	1	0	0	0	0	0	0	5
-54	1	2	1	1	0	1	0	0	0	0	6
-52	1	1	3	0	0	0	0	0	0	0	5
-50	2	4	6	1	0	0	0	0	0	0	13
-48	0	5	4	0	1	0	1	0	0	0	11
-46	1	6	6	0	0	1	0	0	0	0	14
-44	1	8	9	1	1	0	0	0	0	0	20
-42	0	9	7	0	1	0	0	0	0	0	17
-40	0	13	11	0	0	0	0	0	0	0	24
-38	1	2	1	2	0	0	0	0	0	0	6
-36	1	0	4	0	0	0	0	0	0	0	5
-34	1	0	2	0	0	0	0	0	0	0	3
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	9	53	59	6	3	2	1	0	0	0	133

TOTAL NUMBER OF RECORDED ECHOES = 188

NUMBER OF ECHOES USED FOR STATISTICS = 133

AVERAGE BACKSCATTERING CROSS SECTION = .6210E-04 IN dB = -42.07

BACKSCATTERING CROSS SECTION STD DEV = .7664E-04

AVERAGE TARGET STRENGTH IN dB = -45.02

TARGET STRENGTH STD DEV IN dB = 5.65

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 10

NUMBER OF FISH USED = 133
ESTIMATED VOLUME IN CUBIC METERS = .166E+08
DENSITY IN FISH PER CUBIC METER = .803E-05

FILE NUMBER 1 = a:2-t25.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	3	2	0	0	0	0	0	0	0	0	5
-56	1	7	1	2	0	0	0	0	0	0	11
-54	0	2	0	0	0	0	0	0	0	0	2
-52	0	4	2	1	0	0	0	0	0	0	7
-50	3	4	1	0	0	0	0	0	0	0	8
-48	2	6	3	1	0	0	0	0	0	0	12
-46	1	10	1	1	1	0	0	0	0	0	14
-44	1	10	5	1	0	0	0	0	0	0	17
-42	1	3	5	1	0	0	0	0	0	0	10
-40	2	8	4	2	0	0	0	0	0	0	16
-38	0	3	5	0	0	0	0	0	0	0	8
-36	2	1	2	0	0	0	0	0	0	0	5
-34	0	0	3	0	0	0	0	0	0	0	3
-32	1	0	1	0	0	0	0	0	0	0	2
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	17	60	33	9	1	0	0	0	0	0	120

TOTAL NUMBER OF RECORDED ECHOES = 195

NUMBER OF ECHOES USED FOR STATISTICS = 120

AVERAGE BACKSCATTERING CROSS SECTION = .7250E-04 IN dB = -41.40

BACKSCATTERING CROSS SECTION STD DEV = .1097E-03

AVERAGE TARGET STRENGTH IN dB = -45.41

TARGET STRENGTH STD DEV IN dB = 6.46

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 6

NUMBER OF FISH USED = 120
ESTIMATED VOLUME IN CUBIC METERS = .533E+08
DENSITY IN FISH PER CUBIC METER = .225E-05

FILE NUMBER 1 = a:2-t30.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	2	0	1	0	0	0	0	0	0	0	3
-50	2	0	0	0	0	0	0	0	0	0	2
-48	0	0	0	0	1	0	0	0	0	0	1
-46	2	2	1	0	1	0	0	0	0	0	6
-44	2	1	1	0	2	0	0	0	0	0	6
-42	1	2	2	0	0	0	0	0	0	0	5
-40	0	0	0	0	1	0	0	0	0	0	1
-38	1	0	0	0	0	0	0	0	0	0	1
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	10	6	5	0	5	0	0	0	0	0	26

TOTAL NUMBER OF RECORDED ECHOES = 33

NUMBER OF ECHOES USED FOR STATISTICS = 26

AVERAGE BACKSCATTERING CROSS SECTION = .4710E-04 IN dB = -43.27

BACKSCATTERING CROSS SECTION STD DEV = .4591E-04

AVERAGE TARGET STRENGTH IN dB = -44.88

TARGET STRENGTH STD DEV IN dB = 3.94

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 26
ESTIMATED VOLUME IN CUBIC METERS = .158E+08
DENSITY IN FISH PER CUBIC METER = .165E-05

FILE NUMBER 1 = a:2-t32.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	1	0	0	0	0	0	0	0	0	1
-50	1	0	0	0	0	0	0	0	0	0	1
-48	1	1	0	1	0	0	0	0	0	0	3
-46	0	1	0	1	0	0	0	0	0	0	2
-44	3	1	0	4	0	0	0	0	0	0	8
-42	1	4	0	1	0	0	0	0	0	0	6
-40	1	0	0	0	0	0	0	0	0	0	1
-38	1	0	0	0	1	0	0	0	0	0	2
-36	1	1	0	0	1	0	0	0	0	0	3
-34	0	3	0	0	0	0	0	0	0	0	3
-32	0	1	0	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	9	14	0	7	2	0	0	0	0	0	32

TOTAL NUMBER OF RECORDED ECHOES = 46

NUMBER OF ECHOES USED FOR STATISTICS = 32

AVERAGE BACKSCATTERING CROSS SECTION = .1118E-03 IN dB = -39.52

BACKSCATTERING CROSS SECTION STD DEV = .1370E-03

AVERAGE TARGET STRENGTH IN dB = -42.60

TARGET STRENGTH STD DEV IN dB = 5.70

ECHOES WITH BEAM PATTERN FACTORS : 0 dB= 2

NUMBER OF FISH USED = 32
ESTIMATED VOLUME IN CUBIC METERS = .141E+08

FILE NUMBER 1 = a:2-t36.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	1	0	0	0	0	0	0	0	0	0	1
-60	0	0	1	0	0	0	0	0	0	0	1
-58	3	1	1	3	0	0	0	0	0	0	8
-56	1	1	5	2	1	0	0	0	0	0	10
-54	0	2	2	1	1	0	0	0	0	0	6
-52	2	3	8	0	1	0	0	0	0	0	14
-50	4	2	10	0	2	0	0	0	0	0	18
-48	4	2	8	0	0	0	0	0	0	0	14
-46	7	4	6	0	0	0	0	0	0	0	17
-44	11	4	13	0	1	0	0	0	0	0	29
-42	16	10	11	0	1	0	0	0	0	0	38
-40	6	4	5	1	1	0	0	0	0	0	17
-38	5	5	9	0	0	0	0	0	0	0	19
-36	1	3	6	1	1	0	0	0	0	0	12
-34	4	0	7	0	0	0	0	0	0	0	11
-32	2	0	1	0	0	0	0	0	0	0	3
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	67	41	93	8	9	0	0	0	0	0	218

TOTAL NUMBER OF RECORDED ECHOES = 311

NUMBER OF ECHOES USED FOR STATISTICS = 218

AVERAGE BACKSCATTERING CROSS SECTION = .8421E-04 IN dB = -40.75

BACKSCATTERING CROSS SECTION STD DEV = .1156E-03

AVERAGE TARGET STRENGTH IN dB = -44.62

TARGET STRENGTH STD DEV IN dB = 6.52

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 5

NUMBER OF FISH USED = 218
ESTIMATED VOLUME IN CUBIC METERS = .316E+08
DENSITY IN FISH PER CUBIC METER = .689E-05

FILE NUMBER 1 = a:2-t37.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	2	0	1	0	0	0	0	0	0	3
-52	0	1	0	1	0	0	0	0	0	0	2
-50	1	6	1	1	0	0	0	0	0	0	9
-48	1	3	0	3	0	0	0	0	0	0	7
-46	1	2	1	1	0	0	0	0	0	0	5
-44	1	6	4	1	0	0	0	0	0	0	12
-42	3	4	2	0	0	0	0	0	0	0	9
-40	1	9	4	0	0	0	0	0	0	0	14
-38	2	7	1	0	0	0	0	0	0	0	10
-36	3	2	3	0	0	0	0	0	0	0	8
-34	1	2	0	0	0	0	0	0	0	0	3
-32	1	0	0	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	15	45	16	8	0	0	0	0	0	0	84

TOTAL NUMBER OF RECORDED ECHOES = 124

NUMBER OF ECHOES USED FOR STATISTICS = 84

AVERAGE BACKSCATTERING CROSS SECTION = .9530E-04 IN dB = -40.21

BACKSCATTERING CROSS SECTION STD DEV = .1109E-03

AVERAGE TARGET STRENGTH IN dB = -43.03

TARGET STRENGTH STD DEV IN dB = 5.47

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 5

NUMBER OF FISH USED = 84
ESTIMATED VOLUME IN CUBIC METERS = .115E+08
DENSITY IN FISH PER CUBIC METER = .732E-05

FILE NUMBER 1 = a:2-t39.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	1	0	0	0	0	0	0	0	0	1
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	1	0	0	0	0	0	1
-54	0	0	0	1	0	0	0	0	0	0	1
-52	0	2	0	0	0	0	0	0	0	0	2
-50	1	1	2	1	0	0	0	0	0	0	5
-48	2	2	5	1	3	0	0	0	0	0	13
-46	3	8	1	3	1	0	0	0	0	0	16
-44	7	5	7	4	1	0	0	0	0	0	24
-42	13	4	4	0	1	0	0	0	0	0	22
-40	4	1	3	0	0	0	0	0	0	0	8
-38	8	1	2	1	0	0	0	0	0	0	12
-36	5	6	2	1	0	0	0	0	0	0	14
-34	4	3	1	0	0	0	0	0	0	0	8
-32	1	1	0	0	0	0	0	0	0	0	2
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	48	35	27	12	7	0	0	0	0	0	129

TOTAL NUMBER OF RECORDED ECHOES = 180

NUMBER OF ECHOES USED FOR STATISTICS = 129

AVERAGE BACKSCATTERING CROSS SECTION = .1036E-03 IN dB = -39.85

BACKSCATTERING CROSS SECTION STD DEV = .1254E-03

AVERAGE TARGET STRENGTH IN dB = -42.53

TARGET STRENGTH STD DEV IN dB = 5.08

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 15

NUMBER OF FISH USED = 129
ESTIMATED VOLUME IN CUBIC METERS = .154E+08
DENSITY IN FISH PER CUBIC METER = .838E-05

FILE NUMBER 1 = a:2-t40.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	2	0	0	0	0	0	2
-56	0	0	0	0	0	0	0	0	0	0	0
-54	1	0	0	0	0	0	0	0	0	0	1
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	2	0	0	1	0	0	0	0	0	3
-48	2	0	0	0	0	0	0	0	0	0	2
-46	7	0	0	0	0	0	0	0	0	0	7
-44	2	2	0	0	0	0	0	0	0	0	4
-42	3	1	0	0	0	0	0	0	0	0	4
-40	4	0	1	0	0	0	0	0	0	0	5
-38	1	0	0	0	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	1	0	0	0	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	21	5	1	0	3	0	0	0	0	0	30

TOTAL NUMBER OF RECORDED ECHOES = 43

NUMBER OF ECHOES USED FOR STATISTICS = 30

AVERAGE BACKSCATTERING CROSS SECTION = .8142E-04 IN dB = -40.89

BACKSCATTERING CROSS SECTION STD DEV = .1964E-03

AVERAGE TARGET STRENGTH IN dB = -45.02

TARGET STRENGTH STD DEV IN dB = 5.90

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 30
ESTIMATED VOLUME IN CUBIC METERS = .111E+08
DENSITY IN FISH PER CUBIC METER = .269E-05

FILE NUMBER 1 = a:2-t41.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	1	0	0	0	0	0	0	0	0	0	1
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	3	1	0	0	0	0	0	0	0	0	4
-52	1	0	0	0	0	0	0	0	0	0	1
-50	1	1	2	0	0	0	0	0	0	0	4
-48	2	1	2	0	0	0	0	0	0	0	5
-46	1	3	0	0	0	0	0	0	0	0	4
-44	3	6	1	1	0	0	0	0	0	0	11
-42	0	5	0	1	0	0	0	0	0	0	6
-40	3	0	1	0	0	0	0	0	0	0	4
-38	0	1	0	0	0	0	0	0	0	0	1
-36	0	2	0	0	0	0	0	0	0	0	2
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	15	20	6	2	0	0	0	0	0	0	43

TOTAL NUMBER OF RECORDED ECHOES = 68

NUMBER OF ECHOES USED FOR STATISTICS = 43

AVERAGE BACKSCATTERING CROSS SECTION = .5049E-04 IN dB = -42.97

BACKSCATTERING CROSS SECTION STD DEV = .6119E-04

AVERAGE TARGET STRENGTH IN dB = -45.45

TARGET STRENGTH STD DEV IN dB = 5.00

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 5

NUMBER OF FISH USED = 43
ESTIMATED VOLUME IN CUBIC METERS = .181E+08
DENSITY IN FISH PER CUBIC METER = .238E-05

FILE NUMBER 1 = a:2-t43.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	1	0	0	0	0	0	0	0	1
-52	1	0	0	1	0	0	0	0	0	0	2
-50	1	2	1	0	0	0	0	0	0	0	4
-48	4	2	0	0	0	0	0	0	0	0	6
-46	1	3	0	0	0	0	0	0	0	0	4
-44	2	2	0	1	0	0	0	0	0	0	5
-42	2	1	2	0	0	0	0	0	0	0	5
-40	3	2	0	0	0	0	0	0	0	0	5
-38	2	2	0	0	0	0	0	0	0	0	4
-36	0	2	0	1	0	0	0	0	0	0	3
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	16	16	4	3	0	0	0	0	0	0	39

TOTAL NUMBER OF RECORDED ECHOES = 54

NUMBER OF ECHOES USED FOR STATISTICS = 39

AVERAGE BACKSCATTERING CROSS SECTION = .6790E-04 IN dB = -41.68

BACKSCATTERING CROSS SECTION STD DEV = .7106E-04

AVERAGE TARGET STRENGTH IN dB = -44.08

TARGET STRENGTH STD DEV IN dB = 4.90

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 4

NUMBER OF FISH USED = 39
ESTIMATED VOLUME IN CUBIC METERS = .171E+08
DENSITY IN FISH PER CUBIC METER = .228E-05

FILE NUMBER 1 = a:2-t47.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	1	0	0	0	0	0	0	0	0	0	1
-54	0	3	1	0	0	0	0	0	0	0	4
-52	1	0	1	1	0	0	0	0	0	0	3
-50	0	1	0	1	0	0	0	0	0	0	2
-48	2	8	3	0	0	0	0	0	0	0	13
-46	2	6	6	0	0	0	0	0	0	0	14
-44	1	11	8	3	0	0	0	0	0	0	23
-42	0	12	4	0	0	0	0	0	0	0	16
-40	1	14	8	2	0	0	0	0	0	0	25
-38	0	8	8	0	0	0	0	0	0	0	16
-36	0	4	3	0	0	0	0	0	0	0	7
-34	0	1	1	1	0	0	0	0	0	0	3
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	8	68	43	8	0	0	0	0	0	0	127

TOTAL NUMBER OF RECORDED ECHOES = 185

NUMBER OF ECHOES USED FOR STATISTICS = 127

AVERAGE BACKSCATTERING CROSS SECTION = .8154E-04 IN dB = -40.89

BACKSCATTERING CROSS SECTION STD DEV = .7691E-04

AVERAGE TARGET STRENGTH IN dB = -42.87

TARGET STRENGTH STD DEV IN dB = 4.57

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 5

NUMBER OF FISH USED = 127
ESTIMATED VOLUME IN CUBIC METERS = .103E+08
DENSITY IN FISH PER CUBIC METER = .123E-04

FILE NUMBER 1 = a:2-t472.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	2	0	0	0	0	0	0	0	0	2
-58	1	4	1	0	0	0	0	0	0	0	6
-56	1	3	5	0	0	0	0	0	0	0	9
-54	1	11	10	0	0	0	0	0	0	0	22
-52	0	12	12	0	0	0	0	0	0	0	24
-50	0	17	13	1	0	0	0	0	0	0	31
-48	2	29	28	4	0	0	0	0	0	0	63
-46	2	30	33	3	1	0	0	0	0	0	69
-44	1	37	41	5	0	0	0	0	0	0	84
-42	2	37	67	2	0	0	0	0	0	0	108
-40	3	28	49	2	1	0	0	0	0	0	83
-38	1	15	24	2	0	0	0	0	0	0	42
-36	0	10	6	1	0	0	0	0	0	0	17
-34	0	2	1	1	0	0	0	0	0	0	4
-32	0	0	0	1	0	0	0	0	0	0	1
-30	0	0	1	0	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	14	237	291	22	2	0	0	0	0	0	566

TOTAL NUMBER OF RECORDED ECHOES = 757

NUMBER OF ECHOES USED FOR STATISTICS = 566

AVERAGE BACKSCATTERING CROSS SECTION = .6257E-04 IN dB = -42.04

BACKSCATTERING CROSS SECTION STD DEV = .7714E-04

AVERAGE TARGET STRENGTH IN dB = -44.41

TARGET STRENGTH STD DEV IN dB = 4.96

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 10

NUMBER OF FISH USED = 566
ESTIMATED VOLUME IN CUBIC METERS = .107E+08
DENSITY IN FISH PER CUBIC METER = .527E-04

FILE NUMBER 1 = a:2-t48.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	1	0	0	0	0	0	0	0	1
-58	1	0	1	0	0	0	0	0	0	0	2
-56	0	0	1	0	0	0	0	0	0	0	1
-54	0	0	2	1	0	0	0	0	0	0	3
-52	3	0	1	0	0	0	0	0	0	0	4
-50	0	1	8	0	0	0	0	0	0	0	9
-48	1	0	9	1	0	0	0	0	0	0	11
-46	0	0	16	3	0	0	0	0	0	0	19
-44	3	1	19	1	0	0	0	0	0	0	24
-42	2	1	25	1	0	0	0	0	0	0	29
-40	1	3	10	3	0	0	0	0	0	0	17
-38	1	0	5	1	0	0	0	0	0	0	7
-36	0	0	3	1	0	0	0	0	0	0	4
-34	0	0	0	1	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	12	6	101	13	0	0	0	0	0	0	132

TOTAL NUMBER OF RECORDED ECHOES = 186

NUMBER OF ECHOES USED FOR STATISTICS = 132

AVERAGE BACKSCATTERING CROSS SECTION = .5681E-04 IN dB = -42.46

BACKSCATTERING CROSS SECTION STD DEV = .5633E-04

AVERAGE TARGET STRENGTH IN dB = -44.42

TARGET STRENGTH STD DEV IN dB = 4.65

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 3

NUMBER OF FISH USED = 132
ESTIMATED VOLUME IN CUBIC METERS = .565E+07
DENSITY IN FISH PER CUBIC METER = .234E-04

FILE NUMBER 1 = a:2-t49.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	1	0	0	0	0	0	0	1
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	3	0	0	0	0	0	3
-48	1	2	3	3	1	1	0	0	0	0	11
-46	2	2	1	1	3	1	0	0	0	0	10
-44	1	1	4	3	3	0	0	0	0	0	12
-42	1	1	7	4	1	1	0	0	0	0	15
-40	0	2	2	5	1	0	0	0	0	0	10
-38	0	1	4	3	4	0	0	0	0	0	12
-36	0	1	2	1	3	0	0	0	0	0	7
-34	0	1	3	3	0	0	0	0	0	0	7
-32	0	0	0	2	0	0	0	0	0	0	2
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	1	0	0	0	0	0	0	0	1
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	5	11	27	26	19	3	0	0	0	0	91

TOTAL NUMBER OF RECORDED ECHOES = 116

NUMBER OF ECHOES USED FOR STATISTICS = 91

AVERAGE BACKSCATTERING CROSS SECTION = .1303E-03 IN dB = -38.85

BACKSCATTERING CROSS SECTION STD DEV = .1014E-03

AVERAGE TARGET STRENGTH IN dB = -41.60

TARGET STRENGTH STD DEV IN dB = 4.96

* ECHOES WITH BEAM PATTERN FACTORS 0 dB= 4

NUMBER OF FISH USED = 91
ESTIMATED VOLUME IN CUBIC METERS = .537E+07
DENSITY IN FISH PER CUBIC METER = .169E-04

FILE NUMBER 1 = a:2-t50.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	2	0	0	0	0	0	0	0	2
-46	0	0	1	0	0	0	0	0	0	0	1
-44	1	0	2	0	1	0	0	0	0	0	4
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	0	6	0	1	0	0	0	0	0	8

TOTAL NUMBER OF RECORDED ECHOES = 13

NUMBER OF ECHOES USED FOR STATISTICS = 8

AVERAGE BACKSCATTERING CROSS SECTION = .4544E-04 IN dB = -43.43

BACKSCATTERING CROSS SECTION STD DEV = .5067E-04

AVERAGE TARGET STRENGTH IN dB = -44.81

TARGET STRENGTH STD DEV IN dB = 3.27

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 8
ESTIMATED VOLUME IN CUBIC METERS = .316E+07
DENSITY IN FISH PER CUBIC METER = .253E-05

FILE NUMBER 1 = a:2-t51.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	1	0	0	0	0	0	0	0	0	1
-50	0	0	0	0	0	0	0	0	0	0	0
-48	1	0	0	1	0	0	0	0	0	0	2
-46	0	0	0	2	0	0	0	0	0	0	2
-44	0	0	0	1	0	0	0	0	0	0	1
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	1	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	1	0	5	0	0	0	0	0	0	7

TOTAL NUMBER OF RECORDED ECHOES = 11

NUMBER OF ECHOES USED FOR STATISTICS = 7

AVERAGE BACKSCATTERING CROSS SECTION = .3745E-04 IN dB = -44.27

BACKSCATTERING CROSS SECTION STD DEV = .4059E-04

AVERAGE TARGET STRENGTH IN dB = -45.95

TARGET STRENGTH STD DEV IN dB = 3.95

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 7
ESTIMATED VOLUME IN CUBIC METERS = .297E+07
DENSITY IN FISH PER CUBIC METER = .236E-05

FILE NUMBER 1 = a:2-t52.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	1	0	0	0	0	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	1	0	1	0	0	0	0	0	2
-44	0	0	0	0	2	0	0	0	0	0	2
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	1	0	0	0	0	0	1
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	0	2	0	4	0	0	0	0	0	7

TOTAL NUMBER OF RECORDED ECHOES = 8

NUMBER OF ECHOES USED FOR STATISTICS = 7

AVERAGE BACKSCATTERING CROSS SECTION = .5863E-04 IN dB = -42.32

BACKSCATTERING CROSS SECTION STD DEV = .5750E-04

AVERAGE TARGET STRENGTH IN dB = -45.35

TARGET STRENGTH STD DEV IN dB = 7.62

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 7
ESTIMATED VOLUME IN CUBIC METERS = .157E+07
DENSITY IN FISH PER CUBIC METER = .445E-05

FILE NUMBER 1 = a:2-t53.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	1	0	0	0	0	0	0	0	0	0	1
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	0	0	0	0	0	0	0	0	0
-44	0	1	1	0	0	0	0	0	0	0	2
-42	1	1	2	0	0	0	0	0	0	0	4
-40	0	0	0	0	0	0	0	0	0	0	0
-38	1	1	3	0	0	0	0	0	0	0	5
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	3	3	6	0	0	0	0	0	0	0	12

TOTAL NUMBER OF RECORDED ECHOES = 12

NUMBER OF ECHOES USED FOR STATISTICS = 12

AVERAGE BACKSCATTERING CROSS SECTION = .9764E-04 IN dB = -40.10

BACKSCATTERING CROSS SECTION STD DEV = .6411E-04

AVERAGE TARGET STRENGTH IN dB = -41.41

TARGET STRENGTH STD DEV IN dB = 4.24

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB* 1

NUMBER OF FISH USED = 12
ESTIMATED VOLUME IN CUBIC METERS = .531E+07
DENSITY IN FISH PER CUBIC METER = .226E-05

FILE NUMBER 1 = a:2-t54.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	1	0	0	0	0	0	0	0	1
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	1	0	0	0	0	0	0	0	1
-44	0	0	1	0	1	0	0	0	0	0	2
-42	0	0	3	0	0	0	0	0	0	0	3
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	0	6	0	1	0	0	0	0	0	7

TOTAL NUMBER OF RECORDED ECHOES = 10

NUMBER OF ECHOES USED FOR STATISTICS = 7

AVERAGE BACKSCATTERING CROSS SECTION = .4140E-04 IN dB = -43.83

BACKSCATTERING CROSS SECTION STD DEV = .2033E-04

AVERAGE TARGET STRENGTH IN dB = -44.64

TARGET STRENGTH STD DEV IN dB = 3.38

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 7
ESTIMATED VOLUME IN CUBIC METERS = .137E+07
DENSITY IN FISH PER CUBIC METER = .511E-05

FILE NUMBER 1 = a:2-t55.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	1	0	0	0	0	0	0	0	0	1
-58	0	0	0	0	0	0	0	0	0	0	0
-56	1	0	0	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	1	0	0	0	0	0	0	0	0	0	1
-48	1	0	0	0	0	0	0	0	0	0	1
-46	0	2	1	0	0	0	0	0	0	0	3
-44	0	2	1	0	0	0	0	0	0	0	3
-42	1	0	3	1	0	0	0	0	0	0	5
-40	0	1	5	1	0	0	0	0	0	0	7
-38	0	1	1	0	0	0	0	0	0	0	2
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	4	7	12	2	0	0	0	0	0	0	25

TOTAL NUMBER OF RECORDED ECHOES = 37

NUMBER OF ECHOES USED FOR STATISTICS = 25

AVERAGE BACKSCATTERING CROSS SECTION = .7941E-04 IN dB = -41.00

BACKSCATTERING CROSS SECTION STD DEV = .7779E-04

AVERAGE TARGET STRENGTH IN dB = -43.26

TARGET STRENGTH STD DEV IN dB = 5.70

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 25
ESTIMATED VOLUME IN CUBIC METERS = .504E+07
DENSITY IN FISH PER CUBIC METER = .496E-05

FILE NUMBER 1 = a:2-t56.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TD	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	1	0	0	0	0	0	0	0	1
-46	1	0	0	0	0	0	0	0	0	0	1
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	1	0	0	0	0	0	0	0	1
-40	1	0	0	0	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	0	2	0	0	0	0	0	0	0	4

TOTAL NUMBER OF RECORDED ECHOES = 4

NUMBER OF ECHOES USED FOR STATISTICS = 4

AVERAGE BACKSCATTERING CROSS SECTION = .5326E-04 IN dB = -42.74

BACKSCATTERING CROSS SECTION STD DEV = .4997E-04

AVERAGE TARGET STRENGTH IN dB = -44.16

TARGET STRENGTH STD DEV IN dB = 4.04

* ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 0

NUMBER OF FISH USED = 4
ESTIMATED VOLUME IN CUBIC METERS = .423E+07
DENSITY IN FISH PER CUBIC METER = .946E-06

FILE NUMBER 1 = a:2-t61.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	1	0	0	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	2	0	0	1	0	0	0	0	0	0	3
-50	3	1	0	0	0	0	0	0	0	0	4
-48	6	2	0	0	0	0	0	0	0	0	8
-46	3	2	0	0	0	0	0	0	0	0	5
-44	3	3	0	1	0	0	0	0	0	0	7
-42	2	2	0	0	0	0	0	0	0	0	4
-40	1	1	0	0	0	0	0	0	0	0	2
-38	0	1	0	0	0	0	0	0	0	0	1
-36	0	1	0	0	0	0	0	0	0	0	1
-34	2	3	0	0	0	0	0	0	0	0	5
-32	0	1	0	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	23	17	0	2	0	0	0	0	0	0	42

TOTAL NUMBER OF RECORDED ECHOES = 52

NUMBER OF ECHOES USED FOR STATISTICS = 42

AVERAGE BACKSCATTERING CROSS SECTION = .1041E-03 IN dB = -39.82

BACKSCATTERING CROSS SECTION STD DEV = .1703E-03

AVERAGE TARGET STRENGTH IN dB = -44.10

TARGET STRENGTH STD DEV IN dB = 5.97

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 7

NUMBER OF FISH USED = 42
ESTIMATED VOLUME IN CUBIC METERS = .712E+07
DENSITY IN FISH PER CUBIC METER = .590E-05

FILE NUMBER 1 = a:2-t63.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	1	0	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	1	2	0	0	0	0	0	0	0	0	3
-48	1	0	0	0	0	0	0	0	0	0	1
-46	0	2	0	0	0	0	0	0	0	0	2
-44	1	1	0	0	0	0	0	0	0	0	2
-42	2	4	0	0	0	0	0	0	0	0	6
-40	1	3	0	0	0	0	0	0	0	0	4
-38	0	1	0	0	0	0	0	0	0	0	1
-36	0	2	0	0	0	0	0	0	0	0	2
-34	0	1	0	0	0	0	0	0	0	0	1
-32	1	0	0	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	7	18	0	0	0	0	0	0	0	0	25

TOTAL NUMBER OF RECORDED ECHOES = 31

NUMBER OF ECHOES USED FOR STATISTICS = 25

AVERAGE BACKSCATTERING CROSS SECTION = .1072E-03 IN dB = -39.70

BACKSCATTERING CROSS SECTION STD DEV = .1452E-03

AVERAGE TARGET STRENGTH IN dB = -43.05

TARGET STRENGTH STD DEV IN dB = 6.29

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 25
ESTIMATED VOLUME IN CUBIC METERS = .102E+08
DENSITY IN FISH PER CUBIC METER = .245E-05

FILE NUMBER 1 = a:2-t65.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	1	0	0	0	0	0	0	0	1
-54	0	1	0	1	0	0	0	0	0	0	2
-52	0	0	1	0	0	0	0	0	0	0	1
-50	1	1	0	0	0	0	0	0	0	0	2
-48	0	0	1	2	0	0	0	0	0	0	3
-46	0	0	0	0	0	0	0	0	0	0	0
-44	1	0	3	0	0	0	0	0	0	0	4
-42	0	1	2	0	0	0	0	0	0	0	3
-40	0	0	2	0	0	0	0	0	0	0	2
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	0	1	0	0	0	0	0	0	0	1
-34	1	0	0	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	3	3	12	3	0	0	0	0	0	0	21

TOTAL NUMBER OF RECORDED ECHOES = 29

NUMBER OF ECHOES USED FOR STATISTICS = 21

AVERAGE BACKSCATTERING CROSS SECTION = .6195E-04 IN dB = -42.08

BACKSCATTERING CROSS SECTION STD DEV = .8350E-04

AVERAGE TARGET STRENGTH IN dB = -45.45

TARGET STRENGTH STD DEV IN dB = 5.88

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 21
ESTIMATED VOLUME IN CUBIC METERS = .782E+07
DENSITY IN FISH PER CUBIC METER = .268E-05

FILE NUMBER 1 = a:2-t67.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	1	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	1	0	0	0	0	0	1
-52	0	0	0	0	0	0	0	0	0	0	0
-50	2	0	2	0	0	0	0	0	0	0	4
-48	1	0	1	0	0	0	0	0	0	0	2
-46	0	0	3	0	0	0	0	0	0	0	3
-44	1	0	0	0	0	0	0	0	0	0	1
-42	1	0	0	0	0	0	0	0	0	0	1
-40	1	0	1	0	0	0	0	0	0	0	2
-38	1	0	2	0	0	0	0	0	0	0	3
-36	0	0	1	0	0	0	0	0	0	0	1
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	1	0	0	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	7	1	11	0	2	0	0	0	0	0	21

TOTAL NUMBER OF RECORDED ECHOES = 37

NUMBER OF ECHOES USED FOR STATISTICS = 21

AVERAGE BACKSCATTERING CROSS SECTION = .1290E-03 IN dB = -38.89

BACKSCATTERING CROSS SECTION STD DEV = .2344E-03

AVERAGE TARGET STRENGTH IN dB = -44.07

TARGET STRENGTH STD DEV IN dB = 7.14

* ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 3

NUMBER OF FISH USED = 21
ESTIMATED VOLUME IN CUBIC METERS = .104E+08
DENSITY IN FISH PER CUBIC METER = .201E-05

FILE NUMBER 1 = a:2-t60.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	0	2	0	0	0	0	0	0	0	2
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	1	0	0	0	0	0	0	0	1
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	6	0	2	0	0	0	0	0	0	0	8
-44	0	2	2	0	0	3	0	0	0	0	7
-42	2	1	0	0	0	1	0	0	0	0	4
-40	3	0	3	0	0	2	0	0	0	0	8
-38	0	0	0	0	0	0	0	0	0	0	0
-36	1	1	0	0	0	2	0	0	0	0	4
-34	0	0	0	0	0	1	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	12	5	10	0	0	9	0	0	0	0	36

TOTAL NUMBER OF RECORDED ECHOES = 52

NUMBER OF ECHOES USED FOR STATISTICS = 36

AVERAGE BACKSCATTERING CROSS SECTION = .8455E-04 IN dB = -40.73

BACKSCATTERING CROSS SECTION STD DEV = .9374E-04

AVERAGE TARGET STRENGTH IN dB = -43.31

TARGET STRENGTH STD DEV IN dB = 5.49

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 36
ESTIMATED VOLUME IN CUBIC METERS = .930E+07
DENSITY IN FISH PER CUBIC METER = .387E-05

FILE NUMBER 1 = a:2-t69.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	1	0	0	0	0	0	0	0	1
-58	0	0	0	1	0	0	0	0	0	0	1
-56	0	1	2	2	1	0	0	0	0	0	6
-54	0	0	1	1	2	0	0	0	0	0	4
-52	1	0	0	1	0	1	0	0	0	0	3
-50	2	1	1	0	0	0	0	0	0	0	4
-48	1	0	0	0	0	0	0	0	0	0	1
-46	4	3	2	0	0	0	0	0	0	0	9
-44	4	1	4	1	0	1	0	0	0	0	11
-42	3	3	2	0	0	0	0	0	0	0	8
-40	1	1	0	0	0	0	0	1	0	0	3
-38	2	0	0	0	0	0	0	1	0	0	3
-36	2	0	0	0	0	0	0	0	0	0	2
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	1	0	0	0	0	1
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	20	10	13	6	3	3	0	2	0	0	57

TOTAL NUMBER OF RECORDED ECHOES = 95

NUMBER OF ECHOES USED FOR STATISTICS = 57

AVERAGE BACKSCATTERING CROSS SECTION = .6805E-04 IN dB = -41.67

BACKSCATTERING CROSS SECTION STD DEV = .1836E-03

AVERAGE TARGET STRENGTH IN dB = -46.37

TARGET STRENGTH STD DEV IN dB = 6.38

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 57
ESTIMATED VOLUME IN CUBIC METERS = .120E+08
DENSITY IN FISH PER CUBIC METER = .476E-05

6.4.3 - Appendix D3 - October 1988

FILE NUMBER 1 = a:t3.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	1	0	0	0	0	0	0	0	0	1
-60	2	0	0	0	0	0	0	0	0	0	2
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	1	0	0	0	0	0	0	0	0	1
-54	0	1	0	0	0	0	0	0	0	0	1
-52	1	1	0	0	0	0	0	0	0	0	2
-50	0	1	0	0	0	0	0	0	0	0	1
-48	1	1	0	0	0	0	0	0	0	0	2
-46	0	0	0	0	0	0	0	0	0	0	0
-44	1	1	0	0	0	0	0	0	0	0	2
-42	2	0	0	0	0	0	0	0	0	0	2
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	1	0	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	7	10	0	0	0	0	0	0	0	0	17

TOTAL NUMBER OF RECORDED ECHOES = 23

NUMBER OF ECHOES USED FOR STATISTICS = 17

AVERAGE BACKSCATTERING CROSS SECTION = .5840E-04 IN dB = -42.34

BACKSCATTERING CROSS SECTION STD DEV = .1235E-03

AVERAGE TARGET STRENGTH IN dB = 49.57

TARGET STRENGTH STD DEV IN dB = 5.76

ECHOES WITH BEAM PATTERN FACTORS .0 dB= 1

NUMBER OF FISH USED 17
ESTIMATED VOLUME IN CUBIC METERS = .632E+07
DENSITY IN FISH PER CUBIC METER = .269E-05

FILE NUMBER 1 = a:t4.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

	FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
	TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS												SUM
-74	:	0	0	0	0	0	0	0	0	0	0	0
-72	:	0	0	0	0	0	0	0	0	0	0	0
-70	:	0	0	0	0	0	0	0	0	0	0	0
-68	:	0	0	0	0	0	0	0	0	0	0	0
-66	:	0	0	0	0	0	0	0	0	0	0	0
-64	:	0	0	0	0	0	0	0	0	0	0	0
-62	:	0	0	0	0	0	0	0	0	0	0	0
-60	:	1	1	0	0	0	0	0	0	0	0	2
-58	:	2	0	0	0	0	0	0	0	0	0	2
-56	:	1	3	0	0	0	0	0	0	0	0	4
-54	:	0	2	0	0	0	0	0	0	0	0	2
-52	:	0	5	0	0	0	0	0	0	0	0	5
-50	:	0	7	0	0	0	0	0	0	0	0	7
-48	:	0	8	0	0	0	0	0	0	0	0	9
-46	:	0	10	0	0	0	0	0	0	0	0	10
-44	:	0	8	1	0	0	0	0	0	0	0	9
-42	:	0	9	3	0	0	0	0	0	0	0	12
-40	:	0	2	0	0	0	0	0	0	0	0	2
-38	:	0	1	1	0	0	0	0	0	0	0	2
-36	:	0	0	0	0	0	0	0	0	0	0	0
-34	:	0	0	0	0	0	0	0	0	0	0	0
-32	:	0	0	1	0	0	0	0	0	0	0	1
-30	:	0	0	0	0	0	0	0	0	0	0	0
-28	:	0	0	0	0	0	0	0	0	0	0	0
-26	:	0	0	0	0	0	0	0	0	0	0	0
-24	:	0	0	0	0	0	0	0	0	0	0	0
-22	:	0	0	0	0	0	0	0	0	0	0	0
-20	:	0	0	0	0	0	0	0	0	0	0	0
-18	:	0	0	0	0	0	0	0	0	0	0	0
-16	:	0	0	0	0	0	0	0	0	0	0	0
SUM		4	56	6	0	0	0	0	0	0	0	66

TOTAL NUMBER OF RECORDED ECHOES = 80

NUMBER OF ECHOES USED FOR STATISTICS = 66

AVERAGE BACKSCATTERING CROSS SECTION = .4257E-04 IN dB = -43.71

BACKSCATTERING CROSS SECTION STD DEV = .9025E-04

AVERAGE TARGET STRENGTH IN dB = -47.10

TARGET STRENGTH STD DEV IN dB = 5.58

ECHOES WITH BEAM PATTERN FACTORS .0 dB= 8

NUMBER OF FISH USED = 66
ESTIMATED VOLUME IN CUBIC METERS = 5.17E+07
DENSITY IN FISH PER CUBIC METER = 1.28E-04

FILE NUMBER 1 = a:t5.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	1	0	0	0	0	0	0	0	0	1
-64	0	1	0	0	0	0	0	0	0	0	1
-62	1	0	0	0	0	0	0	0	0	0	1
-60	1	1	0	0	0	0	0	0	0	0	2
-58	0	1	1	0	0	0	0	0	0	0	2
-56	0	3	1	0	0	0	0	0	0	0	4
-54	0	2	0	0	0	0	0	0	0	0	2
-52	0	1	3	0	0	0	0	0	0	0	4
-50	0	9	3	0	0	0	0	0	0	0	12
-48	0	11	5	0	0	0	0	0	0	0	16
-46	0	9	4	0	0	0	0	0	0	0	13
-44	0	5	3	0	0	0	0	0	0	0	8
-42	0	6	1	0	0	0	0	0	0	0	7
-40	0	1	2	0	0	0	0	0	0	0	3
-38	0	2	2	0	0	0	0	0	0	0	4
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	54	25	0	0	0	0	0	0	0	81

TOTAL NUMBER OF RECORDED ECHOES = 94

NUMBER OF ECHOES USED FOR STATISTICS = 81

AVERAGE BACKSCATTERING CROSS SECTION = .2977E-04 IN dB = -45.26

BACKSCATTERING CROSS SECTION STD DEV = .7572E-04

AVERAGE TARGET STRENGTH IN dB = -48.75

TARGET STRENGTH STD DEV IN dB = 5.44

ECHOES WITH BEAM PATTERN FACTORS .0 dB= 0

NUMBER OF FISH (SE) = 81
ESTIMATED VOLUME IN CUBIC METERS = .5076+07
DENSITY IN FISH PER CUBIC METER = .15AE-04

FILE NUMBER 1 = ait6.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	1	0	1	0	0	0	0	0	0	0	2
-60	0	2	1	0	0	0	0	0	0	0	3
-58	0	0	1	1	0	0	0	0	0	0	2
-56	0	2	3	1	0	0	0	0	0	0	6
-54	0	7	2	1	0	0	0	0	0	0	10
-52	0	2	1	0	0	0	0	0	0	0	3
-50	0	5	3	0	0	0	0	0	0	0	8
-48	1	6	7	0	0	0	0	0	0	0	14
-46	0	7	4	0	0	0	0	0	0	0	11
-44	0	8	8	0	0	0	0	0	0	0	16
-42	0	3	13	0	0	0	0	0	0	0	16
-40	0	2	3	0	0	0	0	0	0	0	5
-38	0	1	2	0	0	0	0	0	0	0	3
-36	0	0	1	0	0	0	0	0	0	0	1
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	1	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	45	51	4	0	0	0	0	0	0	102

TOTAL NUMBER OF RECORDED ECHOES = 133

NUMBER OF ECHOES USED FOR STATISTICS = 102

AVERAGE BACKSCATTERING CROSS SECTION = .4364E-04 IN DB = -43.60

BACKSCATTERING CROSS SECTION STD DEV = .7140E-04

AVERAGE TARGET STRENGTH IN DB = -47.34

TARGET STRENGTH STD DEV IN DB = 5.17

ECHOES WITH BEAM PATTERN FACTORS .0 OUT 0

NUMBER OF FISH USED = 102
ESTIMATED VOLUME IN CUBIC METERS = .47E+07
DENSITY IN FISH PER CUBIC METER = .22E-04

FILE NUMBER 1 = a:t0.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	1	0	0	0	0	0	0	0	2
-56	0	1	1	0	0	0	0	0	0	0	2
-54	0	4	2	1	0	0	0	0	0	0	7
-52	1	5	1	1	0	0	0	0	0	0	8
-50	1	12	6	1	0	0	0	0	0	0	20
-48	0	6	4	1	0	0	0	0	0	0	11
-46	0	4	3	0	0	0	0	0	0	0	7
-44	0	5	4	0	0	0	0	0	0	0	9
-42	0	3	5	0	0	0	0	0	0	0	8
-40	0	0	1	0	0	0	0	0	0	0	1
-38	0	1	0	0	0	0	0	0	0	0	1
-36	0	0	1	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	42	29	4	0	0	0	0	0	0	77

TOTAL NUMBER OF RECORDED ECHOES = 98

NUMBER OF ECHOES USED FOR STATISTICS = 77

AVERAGE BACKSCATTERING CROSS SECTION = .2581E-04 IN dB = -45.88

BACKSCATTERING CROSS SECTION STD DEV = .7695E-04

AVERAGE TARGET STRENGTH IN dB = -48.38

TARGET STRENGTH STD DEV IN dB = 4.48

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 77
ESTIMATED VOLUME IN CUBIC METERS = .639E+07
DENSITY IN FISH PER CUBIC METER = .120E-04

FILE NUMBER 1 = a:t10.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	1	0	0	0	0	0	0	0	1
-60	0	0	1	0	0	0	0	0	0	0	1
-58	1	0	3	1	0	0	0	0	0	0	5
-56	0	0	7	0	0	0	0	0	0	0	7
-54	0	0	5	1	0	0	0	0	0	0	6
-52	0	1	6	0	0	0	0	0	0	0	7
-50	0	2	13	0	0	0	0	0	0	0	15
-48	0	0	25	0	0	0	0	0	0	0	25
-46	0	1	23	0	0	0	0	0	0	0	24
-44	0	4	15	0	0	0	0	0	0	0	19
-42	0	1	13	0	0	0	0	0	0	0	14
-40	0	1	10	1	0	0	0	0	0	0	12
-38	0	2	10	0	0	0	0	0	0	0	12
-36	0	0	1	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	12	133	3	0	0	0	0	0	0	149

TOTAL NUMBER OF RECORDED ECHOES = 181

NUMBER OF ECHOES USED FOR STATISTICS = 149

AVERAGE BACKSCATTERING CROSS SECTION = .4219E-04 IN dB = -43.75

BACKSCATTERING CROSS SECTION STD DEV = .4756E-04

AVERAGE TARGET STRENGTH IN dB = -46.55

TARGET STRENGTH STD DEV IN dB = 5.45

ECHOES WITH BEAM PATTERN FACTORS .0 dB= 1

NUMBER OF FISH USED = 149
ESTIMATED VOLUME IN CUBIC METERS = .457E+07
DENSITY IN FISH PER CUBIC METER = .326E-04

FILE NUMBER 1 = a:t11.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 / TO 6.00	6.00 / 12.00	12.00 / 18.00	18.00 / 24.00	24.00 / 30.00	30.00 / 36.00	36.00 / 42.00	42.00 / 48.00	48.00 / 54.00	54.00 / 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	1	0	0	0	0	0	0	0	1
-60	0	0	2	0	0	0	0	0	0	0	2
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	1	0	0	0	0	0	0	0	1
-54	0	0	1	0	0	0	0	0	0	0	1
-52	0	0	3	0	0	0	0	0	0	0	3
-50	0	0	4	0	0	0	0	0	0	0	4
-48	0	0	3	0	0	0	0	0	0	0	3
-46	0	0	7	0	0	0	0	0	0	0	7
-44	0	1	7	0	0	0	0	0	0	0	8
-42	0	0	3	0	0	0	0	0	0	0	3
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	2	32	0	0	0	0	0	0	0	34

TOTAL NUMBER OF RECORDED ECHOES = 48

NUMBER OF ECHOES USED FOR STATISTICS = 35

AVERAGE BACKSCATTERING CROSS SECTION = .3228E-04 IN dB = -44.91

BACKSCATTERING CROSS SECTION STD DEV = .4156E-04

AVERAGE TARGET STRENGTH IN dB = -47.94

TARGET STRENGTH STD DEV IN dB = 5.07

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH UNIT = 35
ESTIMATED VOLUME IN CUBIC METERS = .871E+06
DENSITY IN FISH PER CUBIC METER = .402E-04

FILE NUMBER 1 = a:t12.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	1	0	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	3	0	0	0	0	0	0	0	3
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	4	0	0	0	0	0	0	0	4
-52	0	0	7	0	0	0	0	0	0	0	7
-50	0	1	16	1	0	0	0	0	0	0	18
-48	0	1	14	3	0	0	0	0	0	0	18
-46	0	2	17	3	0	0	0	0	0	0	22
-44	0	1	8	2	0	0	0	0	0	0	11
-42	0	0	6	2	0	0	0	0	0	0	8
-40	0	0	12	5	0	0	0	0	0	0	17
-38	0	0	4	2	0	0	0	0	0	0	6
-36	0	0	2	1	0	0	0	0	0	0	3
-34	0	0	0	1	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	5	93	21	0	0	0	0	0	0	119

TOTAL NUMBER OF RECORDED ECHOES = 152

NUMBER OF ECHOES USED FOR STATISTICS = 119

AVERAGE BACKSCATTERING CROSS SECTION = .4809E-04 IN dB = -43.18

BACKSCATTERING CROSS SECTION STD DEV = .5764E-04

AVERAGE TARGET STRENGTH IN dB = -45.94

TARGET STRENGTH STD DEV IN dB = 5.18

ECHOES WITH BEAM PATTERN FACTOR< 0.40= 6

NUMBER OF FISH USED = 114
ESTIMATED VOLUME IN CUBIC METERS = .2486E+07
DENSITY IN FISH PER CUBIC METER = .4585E-04

FILE NUMBER 1 = a:t13.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 TO 12.00	12.00 TO 18.00	18.00 TO 24.00	24.00 TO 30.00	30.00 TO 36.00	36.00 TO 42.00	42.00 TO 48.00	48.00 TO 54.00	54.00 TO 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	2	0	0	0	0	0	0	0	2
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	2	0	0	0	0	0	0	0	2
-56	0	1	1	0	0	0	0	0	0	0	2
-54	0	1	5	0	0	0	0	0	0	0	6
-52	0	0	4	1	0	0	0	0	0	0	5
-50	0	0	13	1	0	0	0	0	0	0	14
-48	0	0	8	1	0	0	0	0	0	0	9
-46	0	2	15	2	0	0	0	0	0	0	19
-44	0	0	20	2	0	0	0	0	0	0	22
-42	0	0	11	3	0	0	0	0	0	0	14
-40	0	0	4	0	0	0	0	0	0	0	4
-38	0	0	2	0	0	0	0	0	0	0	2
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	4	97	10	0	0	0	0	0	0	101

TOTAL NUMBER OF RECORDED ECHOES = 141

NUMBER OF ECHOES USED FOR STATISTICS = 101

AVERAGE BACKSCATTERING CROSS SECTION = .3236E-04 IN dB = -44.90

BACKSCATTERING CROSS SECTION STD DEV = .7005E-04

AVERAGE TARGET STRENGTH IN dB = -44.91

TARGET STRENGTH STD DEV IN dB = 4.79

ECHOES WITH BEAM PATTERN FACTORS @ dB= 1

NUMBER OF FISH USED = 101
ESTIMATED VOLUME IN CUBIC METERS = .363E+07
DENSITY IN FISH PER CUBIC METER = .2796-04

FILE NUMBER 1 = a:t14.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	1	0	0	0	0	0	0	0	1
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	1	0	0	0	0	0	0	0	1
-60	0	0	2	1	2	0	0	0	0	0	5
-58	0	0	4	4	2	0	0	0	0	0	10
-56	0	0	2	5	0	0	0	0	0	0	7
-54	0	2	7	4	0	0	0	0	0	0	13
-52	0	0	5	3	1	0	0	0	0	0	9
-50	0	0	12	6	0	0	0	0	0	0	18
-48	0	0	12	4	2	0	0	0	0	0	18
-46	0	0	11	7	1	0	0	0	0	0	19
-44	0	0	18	8	1	0	0	0	0	0	27
-42	0	0	14	7	0	0	0	0	0	0	21
-40	0	0	3	2	0	0	0	0	0	0	5
-38	0	0	2	0	0	0	0	0	0	0	2
-36	0	0	1	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	2	95	51	9	0	0	0	0	0	157

TOTAL NUMBER OF RECORDED ECHOES = 193

NUMBER OF ECHOES USED FOR STATISTICS = 157

AVERAGE BACKSCATTERING CROSS SECTION = .2885E-04 IN dB = -45.40

BACKSCATTERING CROSS SECTION STD DEV = .7 [illegible]E-04

AVERAGE TARGET STRENGTH IN dB = -48.78

TARGET STRENGTH STD DEV IN dB = 5.11

* ECHOES WITH BEAM PATTERN FACTORS d dB= 3

NUMBER OF FISH USED = 157
ESTIMATED VOLUME IN CUBIC METERS = .67[illegible]E+07
DENSITY IN FISH PER CUBIC METER = .[illegible]E-04

FILE NUMBER 1 = a:t15.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	1	0	0	0	0	0	0	0	1
-62	0	0	1	0	0	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	1	0	0	0	0	0	0	0	1
-56	0	0	2	1	2	0	0	0	0	0	5
-54	0	0	3	2	1	0	0	0	0	0	6
-52	0	0	3	3	0	0	0	0	0	0	6
-50	0	0	9	8	0	0	0	0	0	0	17
-48	0	1	12	9	2	0	0	0	0	0	24
-46	0	6	18	14	0	0	0	0	0	0	38
-44	0	3	20	7	1	0	0	0	0	0	31
-42	0	1	7	4	0	0	0	0	0	0	12
-40	0	2	6	4	0	0	0	0	0	0	12
-38	0	2	4	0	0	0	0	0	0	0	6
-36	0	4	2	1	0	0	0	0	0	0	7
-34	0	0	3	0	0	0	0	0	0	0	3
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	1	0	0	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	1	0	0	0	0	0	0	0	0	1
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	21	92	53	6	0	0	0	0	0	172

TOTAL NUMBER OF RECORDED ECHOES = 227

NUMBER OF ECHOES USED FOR STATISTICS = 172

AVERAGE BACKSCATTERING CROSS SECTION = .6930E-04 IN dB = -41.59

BACKSCATTERING CROSS SECTION STD DEV = .1972E-03

AVERAGE TARGET STRENGTH IN dB = -45.57

TARGET STRENGTH STD DEV IN dB = 5.77

ECHOES WITH BEAM PATTERN FACTORS = 0 dB= 4

NUMBER OF FISH USED = 172
ESTIMATED VOLUME IN CUBIC METERS = .941E+07
DENSITY IN FISH PER CUBIC METER = .183E-04

FILE NUMBER 1 = art16.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	1	0	0	0	0	0	0	0	0	0	1
-66	0	0	0	1	0	0	0	0	0	0	1
-64	0	1	1	1	0	0	0	0	0	0	3
-62	1	1	0	1	0	0	0	0	0	0	3
-60	1	0	4	1	1	0	0	0	0	0	7
-58	1	0	1	1	2	0	0	0	0	0	5
-56	0	1	4	1	1	0	0	0	0	0	7
-54	0	0	2	4	0	0	0	0	0	0	6
-52	0	1	5	10	0	0	1	0	0	0	17
-50	1	1	13	9	0	0	0	0	0	0	24
-48	0	0	15	11	0	0	0	0	0	0	26
-46	0	1	19	8	2	0	0	0	0	0	30
-44	1	1	23	12	0	0	0	0	0	0	37
-42	2	3	16	5	0	0	0	0	0	0	26
-40	0	3	12	5	0	0	0	0	0	0	20
-38	0	2	11	2	0	0	0	0	0	0	15
-36	0	0	0	2	0	0	0	0	0	0	2
-34	0	0	0	1	0	0	0	0	0	0	1
-32	0	3	1	0	0	0	0	0	0	0	4
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	1	0	0	0	0	0	0	0	0	1
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	8	19	127	75	6	0	1	0	0	0	236

TOTAL NUMBER OF RECORDED ECHOES = 314

NUMBER OF ECHOES USED FOR STATISTICS = 236

AVERAGE BACKSCATTERING CROSS SECTION = .5879E-04 IN dB = -42.34

BACKSCATTERING CROSS SECTION STD DEV = .1313E-03

AVERAGE TARGET STRENGTH IN dB = -36.64

TARGET STRENGTH STD DEV IN dB = 6.62

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 5

NUMBER OF FISH USED = 77A
ESTIMATED VOLUME IN CUBIC METERS = .1376+08
DENSITY IN FISH PER CUBIC METER = .172E-04

FILE NUMBER 1 = a:t17s.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	1	1	0	0	0	0	0	0	0	2
-58	0	0	1	0	0	0	0	0	0	0	1
-56	0	0	1	0	0	0	0	0	0	0	1
-54	0	2	2	0	0	0	0	0	0	0	4
-52	0	2	6	0	0	0	0	0	0	0	8
-50	0	3	7	0	0	0	0	0	0	0	10
-48	0	8	12	0	0	0	0	0	0	0	20
-46	0	8	11	0	0	0	0	0	0	0	19
-44	0	9	14	0	0	0	0	0	0	0	23
-42	0	2	10	0	0	0	0	0	0	0	12
-40	0	1	11	0	0	0	0	0	0	0	12
-38	0	3	6	0	0	0	0	0	0	0	9
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	3	0	0	0	0	0	0	0	0	3
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	1	0	0	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	44	82	0	0	0	0	0	0	0	126

TOTAL NUMBER OF RECORDED ECHOES = 191

NUMBER OF ECHOES USED FOR STATISTICS = 126

AVERAGE BACKSCATTERING CROSS SECTION = .5856E-04 IN dB = -42.32

BACKSCATTERING CROSS SECTION STD DEV = .9275E-04

AVERAGE TARGET STRENGTH IN dB = -49.29

TARGET STRENGTH STD DEV IN dB = 5.15

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 5

NUMBER OF FISH USED = 126
ESTIMATED VOLUME IN CUBIC METERS = .592E+07
DENSITY IN FISH PER CUBIC METER = .2127E-04

FILE NUMBER 1 = a:t17d.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	1	0	0	0	0	0	0	1
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	6	0	0	0	0	0	0	6
-56	0	0	1	5	1	0	0	0	0	0	7
-54	1	0	0	2	0	0	0	0	0	0	3
-52	0	0	2	3	1	0	0	0	0	0	6
-50	0	0	8	10	0	0	0	0	0	0	18
-48	0	0	5	11	1	0	0	0	0	0	17
-46	0	0	15	15	3	0	0	0	0	0	33
-44	0	0	12	19	1	0	0	0	0	0	32
-42	0	0	14	7	0	0	0	0	0	0	21
-40	0	0	4	2	1	0	0	0	0	0	7
-38	0	0	1	3	0	0	0	0	0	0	4
-36	0	0	0	2	1	0	0	0	0	0	3
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	0	82	66	9	0	0	0	0	0	158

TOTAL NUMBER OF RECORDED ECHOES = 219

NUMBER OF ECHOES USED FOR STATISTICS = 158

AVERAGE BACKSCATTERING CROSS SECTION = .3811E-04 IN dB = -44.19

BACKSCATTERING CROSS SECTION STD DEV = 44.5E-04

AVERAGE TARGET STRENGTH IN dB = -44.48

TARGET STRENGTH STD DEV IN dB = 4.95

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 1

NUMBER OF FISH DETECTED = 158
ESTIMATED VOLUME IN CUBIC METERS = .120E+08
DENSITY IN FISH PER CUBIC METER = .172E-04

FILE NUMBER 1 = a:t18.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	2	0	0	0	0	0	0	2
-64	0	0	0	1	0	0	0	0	0	0	1
-62	0	1	1	0	1	0	0	0	0	0	3
-60	0	3	1	0	2	0	0	0	0	0	6
-58	0	0	4	2	1	0	0	0	0	0	7
-56	0	0	3	1	1	0	0	0	0	0	5
-54	0	2	1	2	0	0	0	0	0	0	5
-52	0	1	4	7	1	0	0	0	0	0	13
-50	0	2	8	3	0	0	0	0	0	0	13
-48	0	0	12	19	2	0	0	0	0	0	33
-46	0	1	10	15	0	0	0	0	0	0	26
-44	0	1	13	13	2	0	0	0	0	0	29
-42	0	2	9	4	1	0	0	0	0	0	16
-40	0	1	6	3	0	0	0	0	0	0	10
-38	0	1	0	1	1	0	0	0	0	0	3
-36	0	0	0	1	1	0	0	0	0	0	2
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	15	72	74	13	0	0	0	0	0	174

TOTAL NUMBER OF RECORDED ECHOES = 238

NUMBER OF ECHOES USED FOR STATISTICS = 174

AVERAGE BACKSCATTERING CROSS SECTION = .3159E-04 IN dB = -45.01

BACKSCATTERING CROSS SECTION STD DEV = .3675E-04

AVERAGE TARGET STRENGTH IN dB = -49.00

TARGET STRENGTH STD DEV IN dB = 4.07

ECHOES WITH BEAM PATTERN FACTOR= 0 dB= 6

NUMBER OF FISH USED = 174
ESTIMATED VOLUME IN CUBIC METERS = .169E+08
DENSITY IN FISH PER CUBIC METER = .103E-04

FILE NUMBER 1 = art19s.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM / TO	.00 / 6.00	6.00 / 12.00	12.00 / 18.00	18.00 / 24.00	24.00 / 30.00	30.00 / 36.00	36.00 / 42.00	42.00 / 48.00	48.00 / 54.00	54.00 / 60.00	SUM
-74	:	0	0	0	0	0	0	0	0	0	0	0
-72	:	0	0	0	0	0	0	0	0	0	0	0
-70	:	0	0	0	0	0	0	0	0	0	0	0
-68	:	0	0	0	0	0	0	0	0	0	0	0
-66	:	0	0	0	0	0	0	0	0	0	0	0
-64	:	0	0	1	0	0	0	0	0	0	0	1
-62	:	0	0	0	0	0	0	0	0	0	0	0
-60	:	0	0	0	0	0	0	0	0	0	0	0
-58	:	0	0	0	0	0	0	0	0	0	0	0
-56	:	0	0	0	0	0	0	0	0	0	0	0
-54	:	0	0	1	0	0	0	0	0	0	0	1
-52	:	0	0	1	1	0	0	0	0	0	0	2
-50	:	0	3	3	1	0	0	0	0	0	0	7
-48	:	0	1	3	2	0	0	0	0	0	0	6
-46	:	0	1	4	1	0	0	0	0	0	0	6
-44	:	0	0	9	7	0	0	0	0	0	0	16
-42	:	0	0	4	0	0	0	0	0	0	0	4
-40	:	0	1	0	1	0	0	0	0	0	0	2
-38	:	0	0	1	0	0	0	0	0	0	0	1
-36	:	0	0	0	1	0	0	0	0	0	0	1
-34	:	0	0	0	0	0	0	0	0	0	0	0
-32	:	0	0	0	0	0	0	0	0	0	0	0
-30	:	0	0	0	0	0	0	0	0	0	0	0
-28	:	0	0	0	0	0	0	0	0	0	0	0
-26	:	0	0	0	0	0	0	0	0	0	0	0
-24	:	0	0	0	0	0	0	0	0	0	0	0
-22	:	0	0	0	0	0	0	0	0	0	0	0
-20	:	0	0	0	0	0	0	0	0	0	0	0
-18	:	0	0	0	0	0	0	0	0	0	0	0
-16	:	0	0	0	0	0	0	0	0	0	0	0
SUM		0	6	27	14	0	0	0	0	0	0	47

TOTAL NUMBER OF RECORDED ECHOES = 75

NUMBER OF ECHOES USED FOR STATISTICS = 47

AVERAGE BACKSCATTERING CROSS SECTION = .3828E-04 IN dB = -44.17

BACKSCATTERING CROSS SECTION STD DEV = .4050E-04

AVERAGE TARGET STRENGTH IN dB = -44.0[illegible]

TARGET STRENGTH STD DEV IN dB = [illegible]

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH [illegible] = 4
ESTIMATED VOLUME IN CUBIC METERS = .897E+07
DENSITY IN FISH PER CUBIC METER = .5[illegible]4E-05

FILE NUMBER = a:t20a.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	1	0	0	0	0	0	0	0	0	1
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	1	2	0	0	0	0	0	0	0	3
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	2	2	0	0	0	0	0	0	0	4
-48	1	5	2	0	0	0	0	0	0	0	8
-46	1	3	0	0	0	0	0	0	0	0	4
-44	0	6	0	0	0	0	0	0	0	0	6
-42	0	3	2	0	0	0	0	0	0	0	5
-40	0	4	1	0	0	0	0	0	0	0	5
-38	0	3	1	0	0	0	0	0	0	0	4
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	3	0	0	0	0	0	0	0	3
-32	0	0	1	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	1	0	0	0	0	0	0	0	1
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	31	15	0	0	0	0	0	0	0	48

TOTAL NUMBER OF RECORDED ECHOES = 71

NUMBER OF ECHOES USED FOR STATISTICS = 48

AVERAGE BACKSCATTERING CROSS SECTION = .1398E-02 IN dB = -38.55

BACKSCATTERING CROSS SECTION STD DEV = .4061E-02

AVERAGE TARGET STRENGTH IN dB = -41.77

TARGET STRENGTH STD DEV IN dB = 4.71

* ECHOES WITH BEAM PATTERN FACTORS 0 dB= 2

NUMBER OF FISH USED = 48
ESTIMATED VOLUME IN CUBIC METERS = .235E+07
DENSITY IN FISH PER CUBIC METER = .104E-04

FILE NUMBER 1 = a:t20d.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	1	1	0	0	0	0	0	2
-56	0	1	0	6	2	0	0	0	0	0	9
-54	0	0	1	2	4	0	0	0	0	0	7
-52	0	3	3	8	4	0	0	0	0	0	18
-50	0	4	3	5	3	0	0	0	0	0	15
-48	0	1	7	8	10	0	0	0	0	0	26
-46	0	2	9	15	9	0	0	0	0	0	35
-44	0	1	8	25	4	0	0	0	0	0	38
-42	0	5	5	11	4	0	0	0	0	0	25
-40	0	1	5	5	3	0	0	0	0	0	14
-38	0	1	1	1	0	0	0	0	0	0	3
-36	0	0	0	1	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	19	42	88	44	0	0	0	0	0	193

TOTAL NUMBER OF RECORDED ECHOES = 240

NUMBER OF ECHOES USED FOR STATISTICS = 193

AVERAGE BACKSCATTERING CROSS SECTION = .3529E-04 IN dB = -44.52

BACKSCATTERING CROSS SECTION STD DEV = .3417E-04

AVERAGE TARGET STRENGTH IN dB = -46.49

TARGET STRENGTH STD DEV IN dB = 4.50

ECHOES WITH BEAM PATTERN FACTORS .0 dB= 2

NUMBER OF FISH USED = 193
ESTIMATED VOLUME IN CUBIC METERS = .556E+07
DENSITY IN FISH PER CUBIC METER = .347E-04

FILE NUMBER 1 = a:t21s1.001
FILE NUMBER 2 = a:t21s2.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	1	0	0	0	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	1	0	0	0	0	0	0	0	1
-52	0	1	0	0	0	0	0	0	0	0	1
-50	0	0	4	0	0	0	0	0	0	0	4
-48	0	1	4	0	0	0	0	0	0	0	5
-46	0	2	8	0	0	0	0	0	0	0	10
-44	0	3	8	1	0	0	0	0	0	0	12
-42	0	0	8	0	0	0	0	0	0	0	8
-40	0	0	6	1	0	0	0	0	0	0	7
-38	0	1	4	0	0	0	0	0	0	0	5
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	1	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	10	44	2	0	0	0	0	0	0	56

TOTAL NUMBER OF RECORDED ECHOES = 75

NUMBER OF ECHOES USED FOR STATISTICS = 56

AVERAGE BACKSCATTERING CROSS SECTION = .6823E-04 IN dB = -41.66

BACKSCATTERING CROSS SECTION STD DEV = .9567E-04

AVERAGE TARGET STRENGTH IN dB = -44.19

TARGET STRENGTH STD DEV IN dB = 4.96

ECHOES WITH BEAM PATTERN FACTORS - 0 dB= 1

NUMBER OF FISH USED = 56
ESTIMATED VOLUME IN CUBIC METERS = .752E+07
DENSITY IN FISH PER CUBIC METER = .159E-04

FILE NUMBER 1 = a:t21d1.001
FILE NUMBER 2 = a:t21d2.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	1	1	1	0	0	0	0	0	3
-62	0	0	2	1	1	0	0	0	0	0	4
-60	0	2	2	2	0	0	0	0	0	0	6
-58	0	1	0	1	1	0	0	0	0	0	3
-56	0	1	1	0	0	0	0	0	0	0	2
-54	0	1	1	6	5	2	0	0	0	0	15
-52	0	1	1	1	7	0	0	0	0	0	10
-50	0	1	5	6	5	1	0	0	0	0	18
-48	0	2	7	7	9	0	0	0	0	0	25
-46	0	0	4	23	10	1	0	0	0	0	38
-44	0	1	0	19	3	2	0	0	0	0	30
-42	0	0	3	18	3	3	0	0	0	0	27
-40	0	0	3	7	0	0	0	0	0	0	10
-38	0	0	1	4	0	0	0	0	0	0	5
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	2	0	0	0	0	0	0	2
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	10	39	98	45	9	0	0	0	0	201

TOTAL NUMBER OF RECORDED ECHOES = 267

NUMBER OF ECHOES USED FOR STATISTICS = 201

AVERAGE BACKSCATTERING CROSS SECTION = .3596E-04 IN dB = -44.44

BACKSCATTERING CROSS SECTION STD DEV = .5042E-04

AVERAGE TARGET STRENGTH IN dB = -47.77

TARGET STRENGTH STD DEV IN dB = 5.75

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 1

NUMBER OF FISH USED = 201
ESTIMATED VOLUME IN CUBIC METERS = .992E+07
DENSITY IN FISH PER CUBIC METER = .203E-04

FILE NUMBER 1 = a:t22a.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 / TO 6.00	6.00 / 12.00	12.00 / 18.00	18.00 / 24.00	24.00 / 30.00	30.00 / 36.00	36.00 / 42.00	42.00 / 48.00	48.00 / 54.00	54.00 / 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	1	0	0	0	0	0	0	0	0	1
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	1	0	2	0	0	0	0	0	0	3
-60	0	3	0	0	0	0	0	0	0	0	3
-58	0	1	0	1	0	0	0	0	0	0	2
-56	0	5	0	0	0	0	0	0	0	0	5
-54	1	0	1	2	0	0	0	0	0	0	4
-52	1	5	0	1	0	0	0	0	0	0	7
-50	0	0	2	2	0	0	0	0	0	0	4
-48	0	0	5	4	0	0	0	0	0	0	9
-46	0	0	12	1	0	0	0	0	0	0	13
-44	0	1	5	0	3	0	0	0	0	0	9
-42	0	1	3	2	0	0	0	0	0	0	6
-40	0	0	1	0	0	0	0	0	0	0	1
-38	0	0	1	0	1	0	0	0	0	0	2
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	18	31	15	4	0	0	0	0	0	70

TOTAL NUMBER OF RECORDED ECHOES = 97

NUMBER OF ECHOES USED FOR STATISTICS = 70

AVERAGE BACKSCATTERING CROSS SECTION = .3063E-04 IN dB = -45.14

BACKSCATTERING CROSS SECTION STD DEV = .5411E-04

AVERAGE TARGET STRENGTH IN dB = -49.05

TARGET STRENGTH STD DEV IN dB = 5.47

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 70
ESTIMATED VOLUME IN CUBIC METERS = .770E+07
DENSITY IN FISH PER CUBIC METER = .899E-05

FILE NUMBER 1 = a:t22d.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 / TO 6.00	6.00 / 12.00	12.00 / 18.00	18.00 / 24.00	24.00 / 30.00	30.00 / 36.00	36.00 / 42.00	42.00 / 48.00	48.00 / 54.00	54.00 / 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	1	0	0	0	0	0	0	0	1
-60	0	1	1	0	0	0	0	0	0	0	2
-58	0	0	0	1	0	0	0	0	0	0	1
-56	0	2	0	0	0	0	0	0	0	0	2
-54	0	0	0	0	0	1	0	0	0	0	1
-52	0	1	2	0	0	2	1	0	0	0	6
-50	0	0	0	4	0	3	0	1	0	0	8
-48	0	0	1	1	0	1	0	0	0	0	3
-46	0	0	1	3	0	2	0	1	0	0	7
-44	1	0	5	0	1	1	0	0	0	0	8
-42	0	0	2	1	1	2	1	0	0	0	7
-40	0	0	0	0	0	0	0	1	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	1	0	1	0	0	0	2
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	4	13	10	3	12	3	3	0	0	49

TOTAL NUMBER OF RECORDED ECHOES = 68

NUMBER OF ECHOES USED FOR STATISTICS = 49

AVERAGE BACKSCATTERING CROSS SECTION = .3240E-04 IN dB = -44.89

BACKSCATTERING CROSS SECTION STD DEV = .4295E-04

AVERAGE TARGET STRENGTH IN dB = -47.88

TARGET STRENGTH STD DEV IN dB = 5.66

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 49
ESTIMATED VOLUME IN CUBIC METERS = .121E+08
DENSITY IN FISH PER CUBIC METER = .406E-05

FILE NUMBER 1 = a:t23s.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	1	0	0	0	0	0	0	0	0	1
-62	0	1	0	0	0	0	0	0	0	0	1
-60	0	0	1	1	0	0	0	0	0	0	2
-58	1	0	0	0	0	0	0	0	0	0	1
-56	1	0	1	0	0	0	0	0	0	0	2
-54	0	0	0	0	0	0	0	0	0	0	0
-52	2	1	1	0	1	0	0	0	0	0	5
-50	1	1	1	0	0	0	0	0	0	0	3
-48	0	1	3	0	0	0	0	0	0	0	4
-46	1	0	5	0	1	0	0	0	0	0	7
-44	0	1	2	0	0	0	0	0	0	0	3
-42	0	1	3	0	0	0	0	0	0	0	4
-40	0	1	1	0	2	0	0	0	0	0	4
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	6	9	19	1	4	0	0	0	0	0	39

TOTAL NUMBER OF RECORDED ECHOES = 52

NUMBER OF ECHOES USED FOR STATISTICS = 39

AVERAGE BACKSCATTERING CROSS SECTION = .3850E-04 IN dB = -44.15

BACKSCATTERING CROSS SECTION STD DEV = .5160E-04

AVERAGE TARGET STRENGTH IN dB = -48.12

TARGET STRENGTH STD DEV IN db = 6.98

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 39
ESTIMATED VOLUME IN CUBIC METERS = .766E+07
DENSITY IN FISH PER CUBIC METER = .509E-05

FILE NUMBER 1 = a:t23d.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	1	1	1	0	0	0	0	3
-56	0	1	0	1	1	0	0	0	0	0	3
-54	0	0	0	2	2	0	0	0	0	0	4
-52	0	1	0	1	0	1	0	0	0	0	3
-50	1	1	0	2	0	2	0	0	0	0	6
-48	0	0	2	3	2	2	0	0	0	0	9
-46	0	2	0	2	2	2	0	0	0	0	8
-44	0	0	1	5	1	0	0	0	0	0	7
-42	0	0	1	1	0	0	0	0	0	0	2
-40	0	0	1	1	1	0	0	0	0	0	3
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	5	5	19	10	8	0	0	0	0	48

TOTAL NUMBER OF RECORDED ECHOES = 70

NUMBER OF ECHOES USED FOR STATISTICS = 48

AVERAGE BACKSCATTERING CROSS SECTION = .2362E-04 IN dB = -46.27

BACKSCATTERING CROSS SECTION STD DEV = .2399E-04

AVERAGE TARGET STRENGTH IN dB = -48.55

TARGET STRENGTH STD DEV IN dB = 4.99

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 48
ESTIMATED VOLUME IN CUBIC METERS = .143E+08
DENSITY IN FISH PER CUBIC METER = .337E-05

FILE NUMBER 1 = a:t25.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	2	0	3	0	0	0	0	0	0	5
-62	0	0	1	1	1	0	0	0	0	0	3
-60	0	0	1	0	0	0	0	0	0	0	1
-58	0	0	2	1	1	0	0	0	0	0	4
-56	0	1	1	2	0	0	0	0	0	0	4
-54	0	1	0	1	2	0	0	0	0	0	4
-52	1	0	6	5	0	0	0	0	0	0	12
-50	0	4	2	4	0	0	0	0	0	0	10
-48	1	4	5	6	0	0	0	0	0	0	16
-46	3	7	11	6	0	0	0	0	0	0	27
-44	0	4	13	7	1	0	0	0	0	0	25
-42	0	1	6	0	0	0	0	0	0	0	7
-40	1	3	5	0	0	0	0	0	0	0	9
-38	0	2	5	0	0	0	0	0	0	0	7
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	6	29	58	36	5	0	0	0	0	0	134

TOTAL NUMBER OF RECORDED ECHOES = 194

NUMBER OF ECHOES USED FOR STATISTICS = 134

AVERAGE BACKSCATTERING CROSS SECTION = .3333E-04 IN dB = -44.77

BACKSCATTERING CROSS SECTION STD DEV = .3705E-04

AVERAGE TARGET STRENGTH IN dB = -47.74

TARGET STRENGTH STD DEV IN dB = 6.12

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 134
ESTIMATED VOLUME IN CUBIC METERS = .791E+08
DENSITY IN FISH PER CUBIC METER = .169E-05

FILE NUMBER 1 = a:t26.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	1	0	0	0	0	0	0	0	1
-60	0	0	1	0	0	0	0	0	0	0	1
-58	0	0	2	0	0	0	0	0	0	0	2
-56	0	0	2	0	0	0	0	0	0	0	2
-54	1	0	5	0	0	0	0	0	0	0	6
-52	0	0	1	2	0	0	0	0	0	0	3
-50	1	1	4	0	0	0	0	0	0	0	6
-48	0	2	5	0	0	0	0	0	0	0	7
-46	1	1	7	0	0	0	0	0	0	0	9
-44	0	2	1	0	0	0	0	0	0	0	3
-42	0	5	2	0	0	0	0	0	0	0	7
-40	0	2	1	0	0	0	0	0	0	0	3
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	3	14	32	2	0	0	0	0	0	0	51

TOTAL NUMBER OF RECORDED ECHOES = 61

NUMBER OF ECHOES USED FOR STATISTICS = 51

AVERAGE BACKSCATTERING CROSS SECTION = .2958E-04 IN dB = -45.29

BACKSCATTERING CROSS SECTION STD DEV = .3591E-04

AVERAGE TARGET STRENGTH IN dB = -48.24

TARGET STRENGTH STD DEV IN dB = 5.64

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 2

NUMBER OF FISH USED = 51
ESTIMATED VOLUME IN CUBIC METERS = .247E+08
DENSITY IN FISH PER CUBIC METER = .206E-05

FILE NUMBER 1 = a:t30s1.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	1	0	0	0	0	0	0	0	0	1
-44	0	1	0	0	0	0	0	0	0	0	1
-42	1	0	0	0	0	0	0	0	0	0	1
-40	1	0	0	0	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	1	0	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	3	0	0	0	0	0	0	0	0	5

TOTAL NUMBER OF RECORDED ECHOES = 9

NUMBER OF ECHOES USED FOR STATISTICS = 5

AVERAGE BACKSCATTERING CROSS SECTION = .1756E-03 IN dB = -37.55

BACKSCATTERING CROSS SECTION STD.DEV = .2633E-03

AVERAGE TARGET STRENGTH IN dB = -40.55

TARGET STRENGTH STD DEV IN dB = 5.34

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 5
ESTIMATED VOLUME IN CUBIC METERS = .470E+07
DENSITY IN FISH PER CUBIC METER = .106E-05

FILE NUMBER 1 = a:t30d.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	1	0	0	0	0	0	0	0	1
-52	0	0	1	0	0	0	0	0	0	0	1
-50	0	0	1	0	0	0	0	0	0	0	1
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	0	0	0	0	0	0	0	0	0
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	2	0	0	0	0	0	0	0	2
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	0	5	0	0	0	0	0	0	0	5

TOTAL NUMBER OF RECORDED ECHOES = 8

NUMBER OF ECHOES USED FOR STATISTICS = 5

AVERAGE BACKSCATTERING CROSS SECTION = .4014E-04 IN dB = -43.96

BACKSCATTERING CROSS SECTION STD DEV = .4575E-04

AVERAGE TARGET STRENGTH IN dB = -47.24

TARGET STRENGTH STD DEV IN dB = 6.25

* ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 1

NUMBER OF FISH USED = 5
ESTIMATED VOLUME IN CUBIC METERS = .438E+07
DENSITY IN FISH PER CUBIC METER = .114E-05

FILE NUMBER 1 = a:t32s.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	1	0	0	0	0	0	0	0	0	0	1
-66	0	0	0	0	0	0	0	0	0	0	0
-64	1	0	0	0	0	0	0	0	0	0	1
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	2	0	0	0	0	0	0	0	0	0	2
-56	0	0	0	0	0	0	0	0	0	0	0
-54	1	0	0	0	0	0	0	0	0	0	1
-52	1	0	0	0	0	0	0	0	0	0	1
-50	2	0	0	0	0	0	0	0	0	0	2
-48	2	0	0	0	0	0	0	0	0	0	2
-46	1	1	0	0	0	0	0	0	0	0	2
-44	2	0	0	0	0	0	0	0	0	0	2
-42	1	0	0	0	0	0	0	0	0	0	1
-40	1	0	0	0	0	0	0	0	0	0	1
-38	2	0	0	0	0	0	0	0	0	0	2
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	1	0	0	0	0	0	0	0	0	1
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	17	2	0	0	0	0	0	0	0	0	19

TOTAL NUMBER OF RECORDED ECHOES = 25

NUMBER OF ECHOES USED FOR STATISTICS = 19

AVERAGE BACKSCATTERING CROSS SECTION = .8290E-04 IN dB = -40.81

BACKSCATTERING CROSS SECTION STD DEV = .2098E-03

AVERAGE TARGET STRENGTH IN dB = -40.54

TARGET STRENGTH STD DEV IN dB = 9.15

* ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 19
ESTIMATED VOLUME IN CUBIC METERS = .252E+05
DENSITY IN FISH PER CUBIC METER = .754E-06

FILE NUMBER 1 = ait32d.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

	FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TS	TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	SUM
-74		0	0	0	0	0	0	0	0	0	0	0
-72		0	0	0	0	0	0	0	0	0	0	0
-70		0	0	0	0	0	0	0	0	0	0	0
-68		0	0	0	0	0	0	0	0	0	0	0
-66		0	0	0	0	0	0	0	0	0	0	0
-64		0	0	0	0	0	0	0	0	0	0	0
-62		0	0	0	0	0	0	0	0	0	0	0
-60		0	0	0	0	0	0	0	0	0	0	0
-58		0	0	0	0	0	0	0	0	0	0	0
-56		0	0	0	0	0	0	0	0	0	0	0
-54		0	0	0	0	0	0	0	0	0	0	0
-52		0	0	0	0	0	0	0	0	0	0	0
-50		0	0	0	0	0	0	0	0	0	0	0
-48		0	0	0	0	0	0	0	0	0	0	0
-46		0	0	0	0	0	0	0	0	0	0	0
-44		0	0	0	1	0	0	0	0	0	0	1
-42		0	0	0	0	0	0	0	0	0	0	0
-40		0	0	0	0	0	0	0	0	0	0	0
-38		0	0	0	1	0	0	0	0	0	0	1
-36		0	0	0	0	0	0	0	0	0	0	0
-34		0	0	0	0	0	0	0	0	0	0	0
-32		0	0	0	0	0	0	0	0	0	0	0
-30		0	0	0	0	0	0	0	0	0	0	0
-28		0	0	0	0	0	0	0	0	0	0	0
-26		0	0	0	0	0	0	0	0	0	0	0
-24		0	0	0	0	0	0	0	0	0	0	0
-22		0	0	0	0	0	0	0	0	0	0	0
-20		0	0	0	0	0	0	0	0	0	0	0
-18		0	0	0	0	0	0	0	0	0	0	0
-16		0	0	0	0	0	0	0	0	0	0	0
SUM		0	0	0	2	0	0	0	0	0	0	2

TOTAL NUMBER OF RECORDED ECHOES = 7

NUMBER OF ECHOES USED FOR STATISTICS = 2

AVERAGE BACKSCATTERING CROSS SECTION = .1041E-03 IN dB = -39.82

BACKSCATTERING CROSS SECTION STD DEV = .1018E-03

AVERAGE TARGET STRENGTH IN dB = -41.27

TARGET STRENGTH STD DEV IN dB = 5.22

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 2
ESTIMATED VOLUME IN CUBIC METERS = .887E+07
DENSITY IN FISH PER CUBIC METER = .225E-06

FILE NUMBER 1 = a:t33.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

	FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
	TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	
TS												SUM
-74	:	0	0	0	0	0	0	0	0	0	0	0
-72	:	0	0	0	0	0	0	0	0	0	0	0
-70	:	0	0	0	0	0	0	0	0	0	0	0
-68	:	0	0	0	0	0	0	0	0	0	0	0
-66	:	0	0	0	0	0	0	0	0	0	0	0
-64	:	0	0	0	0	0	0	0	0	0	0	0
-62	:	0	0	0	0	0	0	0	0	0	0	0
-60	:	0	0	1	0	0	0	0	0	0	0	1
-58	:	0	0	0	0	0	0	0	0	0	0	0
-56	:	0	0	0	0	0	0	0	0	0	0	0
-54	:	0	1	0	0	0	0	0	0	0	0	1
-52	:	0	0	0	1	0	0	0	0	0	0	1
-50	:	0	0	0	0	0	0	0	0	0	0	0
-48	:	0	1	0	0	0	0	0	0	0	0	1
-46	:	0	0	0	0	0	0	0	0	0	0	0
-44	:	0	1	0	2	0	0	0	0	0	0	3
-42	:	0	1	0	0	0	0	0	0	0	0	1
-40	:	0	2	0	0	0	0	0	0	0	0	2
-38	:	0	0	0	0	0	0	0	0	0	0	0
-36	:	0	0	0	0	0	0	0	0	0	0	0
-34	:	0	0	0	0	0	0	0	0	0	0	0
-32	:	0	0	0	0	0	0	0	0	0	0	0
-30	:	0	0	0	0	0	0	0	0	0	0	0
-28	:	0	0	0	0	0	0	0	0	0	0	0
-26	:	0	0	0	0	0	0	0	0	0	0	0
-24	:	0	0	0	0	0	0	0	0	0	0	0
-22	:	0	0	0	0	0	0	0	0	0	0	0
-20	:	0	0	0	0	0	0	0	0	0	0	0
-18	:	0	0	0	0	0	0	0	0	0	0	0
-16	:	0	0	0	0	0	0	0	0	0	0	0
SUM		0	6	1	3	0	0	0	0	0	0	10

TOTAL NUMBER OF RECORDED ECHOES = 15

NUMBER OF ECHOES USED FOR STATISTICS = 10

AVERAGE BACKSCATTERING CROSS SECTION = .3967E-04 IN dB = -44.02

BACKSCATTERING CROSS SECTION STD DEV = .2504E-04

AVERAGE TARGET STRENGTH IN dB = -46.98

TARGET STRENGTH STD DEV IN dB = 6.77

ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 0

NUMBER OF FISH USED = 10
ESTIMATED VOLUME IN CUBIC METERS = .106E+08
DENSITY IN FISH PER CUBIC METER = .946E-06

FILE NUMBER 1 = a:t34.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	1	0	0	0	0	0	0	0	1
-62	0	0	1	0	2	0	0	0	0	0	3
-60	1	0	1	0	0	0	0	0	0	0	2
-58	0	0	1	1	0	0	0	0	0	0	2
-56	0	1	1	1	1	0	0	0	0	0	4
-54	1	1	0	1	0	0	0	0	0	0	3
-52	1	1	0	0	0	0	0	0	0	0	2
-50	0	0	1	1	1	0	0	0	0	0	3
-48	2	1	2	0	0	0	0	0	0	0	5
-46	0	0	2	1	0	0	0	0	0	0	3
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	1	0	0	0	0	0	0	0	1
-40	0	2	0	2	0	0	0	0	0	0	4
-38	0	0	0	0	2	0	0	0	0	0	2
-36	0	0	1	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	5	6	12	7	6	0	0	0	0	0	36

TOTAL NUMBER OF RECORDED ECHOES = 37

NUMBER OF ECHOES USED FOR STATISTICS = 36

AVERAGE BACKSCATTERING CROSS SECTION = .3448E-04 IN dB = -44.62

BACKSCATTERING CROSS SECTION STD DEV = .6076E-04

AVERAGE TARGET STRENGTH IN dB = -50.32

TARGET STRENGTH STD DEV IN dB = 7.72

* ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 2

NUMBER OF FISH USED = 36
ESTIMATED VOLUME IN CUBIC METERS = .122E+08
DENSITY IN FISH PER CUBIC METER = .295E-05

FILE NUMBER 1 = a:t36s.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	1	0	0	0	0	0	0	0	0	0	1
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	2	0	0	0	0	0	0	0	2
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	1	0	0	0	0	0	0	0	1
-52	0	2	1	0	0	0	0	0	0	0	3
-50	0	2	0	0	0	0	0	0	0	0	2
-48	0	1	1	0	0	0	0	0	0	0	2
-46	0	2	1	0	0	0	0	0	0	0	3
-44	0	3	0	0	0	0	0	0	0	0	3
-42	0	2	0	0	0	0	0	0	0	0	2
-40	0	1	0	0	0	0	0	0	0	0	1
-38	0	1	0	0	0	0	0	0	0	0	1
-36	0	2	0	0	0	0	0	0	0	0	2
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	1	0	0	0	0	0	0	0	0	1
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	17	6	0	0	0	0	0	0	0	24

TOTAL NUMBER OF RECORDED ECHOES = 28

NUMBER OF ECHOES USED FOR STATISTICS = 24

AVERAGE BACKSCATTERING CROSS SECTION = .1145E-03 IN dB = -39.41

BACKSCATTERING CROSS SECTION STD DEV = .3358E-03

AVERAGE TARGET STRENGTH IN dB = -46.95

TARGET STRENGTH STD DEV IN dB = 9.47

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 3

NUMBER OF FISH USED = 24
ESTIMATED VOLUME IN CUBIC METERS = .166E+08
DENSITY IN FISH PER CUBIC METER = .144E-05

FILE NUMBER 1 = a:t36d.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	1	0	0	0	0	0	0	0	1
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	1	0	0	0	0	0	0	0	1
-44	0	0	1	0	0	0	0	0	0	0	1
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	1	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	0	5	0	0	0	0	0	0	0	5

TOTAL NUMBER OF RECORDED ECHOES = 12

NUMBER OF ECHOES USED FOR STATISTICS = 5

AVERAGE BACKSCATTERING CROSS SECTION = .125AE-03 IN dB = -39.01

BACKSCATTERING CROSS SECTION STD DEV = .149E-03

AVERAGE TARGET STRENGTH IN dB = -42.19

TARGET STRENGTH STD DEV IN dB = 6.19

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 5
ESTIMATED VOLUME IN CUBIC METERS = .145E+08
DENSITY IN FISH PER CUBIC METER = .34eE-06

FILE NUMBER 1 = a:t37a.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	1	0	0	1	0	0	0	0	0	2
-54	0	3	3	2	2	0	0	0	0	0	10
-52	0	0	0	0	3	0	0	0	0	0	3
-50	0	0	2	1	2	1	0	0	0	0	6
-48	0	0	1	3	0	0	0	0	0	0	4
-46	0	2	0	5	1	1	0	0	0	0	9
-44	1	4	0	3	0	0	0	0	0	0	8
-42	0	4	3	3	0	0	0	0	0	0	12
-40	1	0	3	2	0	0	0	0	0	0	6
-38	1	0	2	2	0	0	0	0	0	0	5
-36	0	1	1	4	0	0	0	0	0	0	6
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	2	0	0	0	0	0	0	0	0	2
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	3	19	15	35	9	2	0	0	0	0	73

TOTAL NUMBER OF RECORDED ECHOES = 99

NUMBER OF ECHOES USED FOR STATISTICS = 73

AVERAGE BACKSCATTERING CROSS SECTION = .7728E-04 IN dB = -41.12

BACKSCATTERING CROSS SECTION STD DEV = .1205E-03

AVERAGE TARGET STRENGTH IN dB = -45.00

TARGET STRENGTH STD DEV IN dB = 6.21

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 1

NUMBER OF FISH USED = 73
ESTIMATED VOLUME IN CUBIC METERS = .1678E+08
DENSITY IN FISH PER CUBIC METER = .447E-05

FILE NUMBER 1 = a:t30.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	1	0	0	0	0	0	0	0	0	0	1
-62	0	0	0	1	0	0	0	0	0	0	1
-60	0	0	0	1	0	0	0	0	0	0	1
-58	0	2	0	0	0	0	0	0	0	0	2
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	1	2	1	0	0	0	0	0	4
-52	0	0	2	0	0	0	0	0	0	0	2
-50	0	1	2	0	0	0	0	0	0	0	3
-48	0	0	3	0	0	0	0	0	0	0	3
-46	0	0	1	4	0	0	0	0	0	0	5
-44	1	3	5	2	0	0	0	0	0	0	11
-42	0	0	3	1	0	0	0	0	0	0	4
-40	2	0	3	3	0	0	0	0	0	0	8
-38	0	1	1	2	1	0	0	0	0	0	5
-36	0	0	2	2	0	0	0	0	0	0	4
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	1	0	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	4	7	24	18	2	0	0	0	0	0	55

TOTAL NUMBER OF RECORDED ECHOES = 100

NUMBER OF ECHOES USED FOR STATISTICS = 55

AVERAGE BACKSCATTERING CROSS SECTION = .7033E-04 IN dB = -41.53

BACKSCATTERING CROSS SECTION STD DEV = .9131E-04

AVERAGE TARGET STRENGTH IN dB = -45.41

TARGET STRENGTH STD DEV IN dB = 7.02

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 0

NUMBER OF FISH USED = 55
ESTIMATED VOLUME IN CUBIC METERS = .233E+08
DENSITY IN FISH PER CUBIC METER = .237E-05

FILE NUMBER 1 = a:t40a.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	2	0	0	0	0	0	0	0	2
-60	1	1	2	0	0	0	0	0	0	0	4
-58	0	2	1	0	0	0	0	0	0	0	3
-56	1	0	0	1	0	0	0	0	0	0	2
-54	1	2	0	1	0	0	0	0	0	0	4
-52	0	2	0	0	0	0	0	0	0	0	2
-50	1	0	1	0	0	0	0	0	0	0	2
-48	0	2	1	0	0	0	0	0	0	0	3
-46	0	1	3	1	0	0	0	0	0	0	5
-44	1	4	4	0	0	0	0	0	0	0	9
-42	0	2	3	0	0	0	0	0	0	0	5
-40	0	0	2	0	0	0	0	0	0	0	2
-38	0	2	3	0	0	0	0	0	0	0	5
-36	0	0	3	0	0	0	0	0	0	0	3
-34	0	2	0	0	0	0	0	0	0	0	2
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	5	20	25	3	0	0	0	0	0	0	53

TOTAL NUMBER OF RECORDED ECHOES = 87

NUMBER OF ECHOES USED FOR STATISTICS = 53

AVERAGE BACKSCATTERING CROSS SECTION = .6641E-04 IN dB = -41.79

BACKSCATTERING CROSS SECTION STD DEV = .1049E-03

AVERAGE TARGET STRENGTH IN dB = -41.78

TARGET STRENGTH STD DEV IN dB = 1.59

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 53
ESTIMATED VOLUME IN CUBIC METERS = .199E+08
DENSITY IN FISH PER CUBIC METER = .266E-05

FILE NUMBER 1 = ait43a.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 TO 7.62	7.62 15.24	15.24 22.86	22.86 30.48	30.48 38.10	38.10 45.72	45.72 53.34	53.34 60.96	60.96 68.58	68.58 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	1	0	0	0	0	0	0	0	0	0	1
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	1	1	0	0	0	0	0	0	0	0	2
-60	0	1	0	0	0	0	0	0	0	0	1
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	1	0	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	1	0	0	0	0	0	0	0	0	1
-50	0	0	0	0	0	0	0	0	0	0	0
-48	1	0	0	0	0	0	0	0	0	0	1
-46	0	1	0	0	0	0	0	0	0	0	1
-44	0	1	1	0	0	0	0	0	0	0	2
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	1	0	0	0	0	0	0	0	0	1
-38	0	1	0	0	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	1	0	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	3	10	1	0	0	0	0	0	0	0	14

TOTAL NUMBER OF RECORDED ECHOES = 35

NUMBER OF ECHOES USED FOR STATISTICS = 14

AVERAGE BACKSCATTERING CROSS SECTION = .5561E-04 IN dB = -42.55

BACKSCATTERING CROSS SECTION STD DEV = .9979E-04

AVERAGE TARGET STRENGTH IN dB = -50.77

TARGET STRENGTH STD DEV IN dB = 10.77

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 14
ESTIMATED VOLUME IN CUBIC METERS = .155E+08
DENSITY IN FISH PER CUBIC METER = .904E-06

FILE NUMBER 1 = a:t43b.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	1	0	0	0	0	0	0	0	0	0	1
-64	1	0	0	0	0	0	0	0	0	0	1
-62	0	1	0	0	0	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	0	0	0	0	0	0	0	0	1
-56	1	1	0	0	0	0	0	0	0	0	2
-54	1	2	0	0	0	0	0	0	0	0	3
-52	1	2	0	0	0	0	0	0	0	0	3
-50	2	1	0	1	0	0	0	0	0	0	4
-48	2	4	0	4	0	0	0	0	0	0	10
-46	2	7	1	6	0	0	0	0	0	0	16
-44	3	4	1	1	0	0	0	0	0	0	9
-42	2	5	1	1	0	0	0	0	0	0	9
-40	4	5	2	2	0	0	0	0	0	0	13
-38	1	3	1	1	0	0	0	0	0	0	6
-36	1	1	2	1	0	0	0	0	0	0	5
-34	1	1	1	0	0	0	0	0	0	0	3
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	23	38	9	17	0	0	0	0	0	0	87

TOTAL NUMBER OF RECORDED ECHOES = 141

NUMBER OF ECHOES USED FOR STATISTICS = 87

AVERAGE BACKSCATTERING CROSS SECTION = .7193E-04 IN dB = -41.43

BACKSCATTERING CROSS SECTION STD DEV = .8942E-04

AVERAGE TARGET STRENGTH IN dB = -44.79

TARGET STRENGTH STD DEV IN dB = 6.41

ECHOES WITH BEAM PATTERN FACTORS < 0 db= 2

NUMBER OF FISH USED = 87
ESTIMATED VOLUME IN CUBIC METERS = .272E+08
DENSITY IN FISH PER CUBIC METER = .320E-05

FILE NUMBER 1 = a:t44a.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

	FROM	.00	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	
TS	TO	7.62	15.24	22.86	30.48	38.10	45.72	53.34	60.96	68.58	76.20	SUM
-74	:	0	0	0	0	0	0	0	0	0	0	0
-72	:	0	0	0	0	0	0	0	0	0	0	0
-70	:	0	0	0	0	0	0	0	0	0	0	0
-68	:	0	0	0	0	0	0	0	0	0	0	0
-66	:	0	0	0	0	0	0	0	0	0	0	0
-64	:	0	0	0	0	0	0	0	0	0	0	0
-62	:	0	1	0	0	0	0	0	0	0	0	1
-60	:	1	3	2	0	0	0	0	0	0	0	6
-58	:	1	3	0	0	0	0	0	0	0	0	4
-56	:	0	4	1	0	0	0	0	0	0	0	5
-54	:	1	4	2	0	0	0	0	0	0	0	7
-52	:	0	7	0	0	0	0	0	0	0	0	7
-50	:	3	13	1	0	0	0	0	0	0	0	17
-48	:	5	17	1	0	0	0	0	0	0	0	23
-46	:	3	26	2	1	0	0	0	0	0	0	32
-44	:	4	29	3	1	0	0	0	0	0	0	37
-42	:	8	29	3	0	0	0	0	0	0	0	40
-40	:	6	30	4	1	0	0	0	0	0	0	41
-38	:	2	21	5	0	0	0	0	0	0	0	28
-36	:	0	11	3	1	0	0	0	0	0	0	15
-34	:	1	12	3	0	0	0	0	0	0	0	16
-32	:	0	4	1	0	0	0	0	0	0	0	5
-30	:	1	1	0	0	0	0	0	0	0	0	2
-28	:	0	0	0	0	0	0	0	0	0	0	0
-26	:	0	0	0	0	0	0	0	0	0	0	0
-24	:	0	0	0	0	0	0	0	0	0	0	0
-22	:	0	0	0	0	0	0	0	0	0	0	0
-20	:	0	0	0	0	0	0	0	0	0	0	0
-18	:	0	0	0	0	0	0	0	0	0	0	0
-16	:	0	0	0	0	0	0	0	0	0	0	0
SUM		36	215	31	4	0	0	0	0	0	0	286

TOTAL NUMBER OF RECORDED ECHOES = 452

NUMBER OF ECHOES USED FOR STATISTICS = 286

AVERAGE BACKSCATTERING CROSS SECTION = .1025E-03 IN dB = -39.89

BACKSCATTERING CROSS SECTION STD DEV = .1390E-03

AVERAGE TARGET STRENGTH IN dB = -41.41

TARGET STRENGTH STD DEV IN dB = 5.2e

* ECHOES WITH BEAM PATTERN FACTORS 0 dB= 14

NUMBER OF FISH USED = 286
ESTIMATED VOLUME IN CUBIC METERS = .3196+08
DENSITY IN FISH PER CUBIC METER = .896E-05

FILE NUMBER 1 = a:t44b.001

SUMMARY OF DATA FROM DEPTH .0 TO 76.2

DEPTH INTERVALS

TS	FROM .00 / TO 7.62	7.62 / 15.24	15.24 / 22.86	22.86 / 30.48	30.48 / 38.10	38.10 / 45.72	45.72 / 53.34	53.34 / 60.96	60.96 / 68.58	68.58 / 76.20	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	1	0	0	0	0	0	0	0	0	0	1
-56	0	1	0	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	1	0	0	0	0	0	0	0	0	1
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	1	0	0	0	0	0	0	0	0	1
-46	0	1	0	0	0	0	0	0	0	0	1
-44	0	7	0	0	0	0	0	0	0	0	7
-42	0	2	0	0	0	0	0	0	0	0	2
-40	0	2	0	0	0	0	0	0	0	0	2
-38	0	2	0	0	0	0	0	0	0	0	2
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	3	0	0	0	0	0	0	0	0	3
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	20	0	0	0	0	0	0	0	0	21

TOTAL NUMBER OF RECORDED ECHOES = 34

NUMBER OF ECHOES USED FOR STATISTICS = 21

AVERAGE BACKSCATTERING CROSS SECTION = .1058E-03 IN dB = -39.76

BACKSCATTERING CROSS SECTION STD DEV = .1359E-03

AVERAGE TARGET STRENGTH IN dB = -43.34

TARGET STRENGTH STD DEV IN dB = 6.62

ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 21
ESTIMATED VOLUME IN CUBIC METERS = .330E+08
DENSITY IN FISH PER CUBIC METER = .637E-06

FILE NUMBER 1 = a:t47s.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	1	0	0	0	0	0	0	0	2
-56	0	0	0	0	1	0	0	0	0	0	1
-54	0	1	0	0	0	0	0	0	0	0	1
-52	0	1	1	1	0	0	0	0	0	0	3
-50	1	0	1	1	3	0	0	0	0	0	6
-48	0	0	5	1	3	0	0	0	0	0	9
-46	1	2	2	5	5	0	0	0	0	0	15
-44	0	2	1	2	1	0	0	0	0	0	6
-42	0	1	0	3	1	0	0	0	0	0	5
-40	0	2	0	0	0	0	0	0	0	0	2
-38	0	0	0	1	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	10	11	14	14	0	0	0	0	0	51

TOTAL NUMBER OF RECORDED ECHOES = 64

NUMBER OF ECHOES USED FOR STATISTICS = 51

AVERAGE BACKSCATTERING CROSS SECTION = .3002E-04 IN dB = -45.23

BACKSCATTERING CROSS SECTION STD DEV = .2830E-04

AVERAGE TARGET STRENGTH IN dB = -46.90

TARGET STRENGTH STD DEV IN dB = 4.10

ECHOES WITH BEAM PATTERN FACTORS @ dB= 0

NUMBER OF FISH USED = 51
ESTIMATED VOLUME IN CUBIC METERS = .542E+07
DENSITY IN FISH PER CUBIC METER = .941E-05

FILE NUMBER 1 = ait47d.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	1	0	0	0	0	1
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	1	0	0	0	0	0	0	1
-50	0	0	0	3	0	1	0	0	0	0	4
-48	0	0	0	0	0	0	0	0	0	0	0
-46	1	0	0	4	1	0	0	0	0	0	6
-44	0	0	0	1	3	1	0	0	0	0	5
-42	0	0	0	1	0	0	0	0	0	0	1
-40	1	1	0	0	0	1	0	0	0	0	3
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	1	0	0	0	0	0	0	0	0	1
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	2	2	0	10	4	4	0	0	0	0	22

TOTAL NUMBER OF RECORDED ECHOES = 20

NUMBER OF ECHOES USED FOR STATISTICS = 22

AVERAGE BACKSCATTERING CROSS SECTION = .1365E-02 IN dB = -38.65

BACKSCATTERING CROSS SECTION STD DEV = .4698E-03

AVERAGE TARGET STRENGTH IN dB = -45.36

TARGET STRENGTH STD DEV IN dB = 1.51

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 22
ESTIMATED VOLUME IN CUBIC METERS = .4437E+07
DENSITY IN FISH PER CUBIC METER = .4957E-05

FILE NUMBER 1 = a:t40.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	1	0	0	0	0	0	0	0	0	1
-58	0	0	0	1	1	0	0	0	0	0	2
-56	0	3	0	0	0	1	0	0	0	0	4
-54	0	0	0	0	1	1	0	0	0	0	2
-52	0	0	1	0	2	0	0	0	0	0	3
-50	0	3	0	2	4	1	0	0	0	0	10
-48	0	4	1	4	0	0	0	0	0	0	9
-46	0	3	1	4	6	0	0	0	0	0	14
-44	0	4	1	6	5	1	0	0	0	0	17
-42	0	0	1	0	2	0	0	0	0	0	3
-40	0	0	3	1	5	0	0	0	0	0	9
-38	0	0	0	3	0	0	0	0	0	0	3
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	18	8	21	26	4	0	0	0	0	77

TOTAL NUMBER OF RECORDED ECHOES = 94

NUMBER OF ECHOES USED FOR STATISTICS = 77

AVERAGE BACKSCATTERING CROSS SECTION = .3790E-04 IN dB = -44.20

BACKSCATTERING CROSS SECTION STD DEV = .7839E-04

AVERAGE TARGET STRENGTH IN dB = -46.45

TARGET STRENGTH STD DEV IN dB = 4.90

% ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 77
ESTIMATED VOLUME IN CUBIC METERS = .475E+07
DENSITY IN FISH PER CUBIC METER = .162E-04

FILE NUMBER 1 = a:t49.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	1	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	3	0	0	0	0	0	3
-56	0	0	0	1	0	0	0	0	0	0	1
-54	0	0	0	0	1	1	0	0	0	0	2
-52	0	0	3	1	1	0	0	0	0	0	5
-50	0	0	2	1	0	0	0	0	0	0	3
-48	0	0	1	1	3	0	0	0	0	0	5
-46	0	1	4	1	1	0	0	0	0	0	7
-44	0	1	1	1	4	0	0	0	0	0	7
-42	0	0	0	3	1	0	0	0	0	0	4
-40	0	0	0	2	3	1	0	0	0	0	6
-38	1	0	0	1	1	0	0	0	0	0	3
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	2	11	12	19	2	0	0	0	0	47

TOTAL NUMBER OF RECORDED ECHOES = 66

NUMBER OF ECHOES USED FOR STATISTICS = 47

AVERAGE BACKSCATTERING CROSS SECTION = .4002E-04 IN dB = -43.98

BACKSCATTERING CROSS SECTION STD DEV = .4017E-04

AVERAGE TARGET STRENGTH IN dB = -44.88

TARGET STRENGTH STD DEV IN db = 5.97

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 47
ESTIMATED VOLUME IN CUBIC METERS = .407E+07
DENSITY IN FISH PER CUBIC METER = .115E-04

FILE NUMBER 1 = a:t50.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	1	4	0	0	0	0	0	0	5
-46	0	0	0	3	0	0	0	0	0	0	3
-44	0	0	2	1	0	0	0	0	0	0	3
-42	0	0	2	1	1	0	0	0	0	0	4
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	0	5	9	1	0	0	0	0	0	15

TOTAL NUMBER OF RECORDED ECHOES = 19

NUMBER OF ECHOES USED FOR STATISTICS = 15

AVERAGE BACKSCATTERING CROSS SECTION = .3417E-04 IN dB = -44.66

BACKSCATTERING CROSS SECTION STD DEV = .1920E-04

AVERAGE TARGET STRENGTH IN dB = -45.72

TARGET STRENGTH STD DEV IN dB = 2.51

ECHOES WITH BEAM PATTERN FACTORS Ø dB= Ø

NUMBER OF FISH USED = 15
ESTIMATED VOLUME IN CUBIC METERS = .2306+07
DENSITY IN FISH PER CUBIC METER = .652E-05

FILE NUMBER 1 = a:t51.00:

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	1	1	0	0	0	0	0	2
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	1	0	2	0	0	0	0	0	3
-50	0	0	0	0	2	0	0	0	0	0	2
-48	0	0	1	2	0	5	0	0	0	0	8
-46	0	0	1	1	5	1	0	0	0	0	9
-44	0	0	3	2	1	1	0	0	0	0	7
-42	0	0	0	0	1	1	0	0	0	0	2
-40	0	0	0	2	1	0	0	0	0	0	3
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	1	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	0	6	8	14	8	0	0	0	0	36

TOTAL NUMBER OF RECORDED ECHOES = 47

NUMBER OF ECHOES USED FOR STATISTICS = 36

AVERAGE BACKSCATTERING CROSS SECTION = .3695E-04 IN dB = -44.32

BACKSCATTERING CROSS SECTION STD DEV = .4531E-04

AVERAGE TARGET STRENGTH IN dB = -46.40

TARGET STRENGTH STD DEV IN dB = 4.25

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 36
ESTIMATED VOLUME IN CUBIC METERS = .479E+07
DENSITY IN FISH PER CUBIC METER = .752E-05

FILE NUMBER 1 = a:t52.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	1	0	0	0	0	0	0	1
-58	0	0	1	0	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	2	0	0	0	0	0	0	2
-50	0	2	0	1	0	0	0	0	0	0	3
-48	0	1	0	2	0	0	0	0	0	0	3
-46	0	1	2	0	0	0	0	0	0	0	3
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	2	0	0	0	0	0	0	0	2
-38	0	1	0	0	0	0	0	0	0	0	1
-36	0	1	0	0	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	6	5	6	0	0	0	0	0	0	17

TOTAL NUMBER OF RECORDED ECHOES = 22

NUMBER OF ECHOES USED FOR STATISTICS = 17

AVERAGE BACKSCATTERING CROSS SECTION = .4520E-04 IN dB = -43.45

BACKSCATTERING CROSS SECTION STD DEV = .7415E-04

AVERAGE TARGET STRENGTH IN dB = -43.77

TARGET STRENGTH STD DEV IN dB = 6.42

% ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 17
ESTIMATED VOLUME IN CUBIC METERS = .300E+07
DENSITY IN FISH PER CUBIC METER = .567E-05

FILE NUMBER 1 = art53.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	1	0	0	0	0	0	0	0	0	0	1
-46	0	0	0	1	0	0	0	0	0	0	1
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	1	0	0	0	0	0	0	1
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	0	0	2	0	0	0	0	0	0	3

TOTAL NUMBER OF RECORDED ECHOES = 8

NUMBER OF ECHOES USED FOR STATISTICS = 3

AVERAGE BACKSCATTERING CROSS SECTION = .3e97E-04 IN dB = -44.32

BACKSCATTERING CROSS SECTION STD DEV = .3eeeE-04

AVERAGE TARGET STRENGTH IN db = -45.1[illegible]

TARGET STRENGTH STD DEV IN dB = 1.36

ECHOES WITH BEAM PATTERN FACTORS = 0 dB= 0

NUMBER OF FISH USED =
ESTIMATED VOLUME IN CUBIC METERS = .471E+07
DENSITY IN FISH PER CUBIC METER = .637E-06

FILE NUMBER 1 = a:t54.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	1	0	0	0	0	0	0	1
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	0	1	0	0	0	0	0	0	1
-44	0	0	0	1	0	0	0	0	0	0	1
-42	0	0	0	1	0	0	0	0	0	0	1
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	0	0	4	0	0	0	0	0	0	4

TOTAL NUMBER OF RECORDED ECHOES = 6

NUMBER OF ECHOES USED FOR STATISTICS = 4

AVERAGE BACKSCATTERING CROSS SECTION = .2824E-04 IN dB = -45.49

BACKSCATTERING CROSS SECTION STD DEV = .2094E-04

AVERAGE TARGET STRENGTH IN dB = -45.94

TARGET STRENGTH STD DEV IN dB = 4.71

ECHOES WITH BEAM PATTERN FACTORS = 0 dB= 0

NUMBER OF FISH USED = 4
ESTIMATED VOLUME IN CUBIC METERS = .114E+07
DENSITY IN FISH PER CUBIC METER = .350E-05

FILE NUMBER 1 = a:t55.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	1	0	1	0	0	0	0	0	0	2
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	0	0	0	1	0	0	0	0	1
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	0	0	1	0	0	0	0	1
-40	0	1	0	0	0	0	0	0	0	0	1
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	1	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	2	0	1	0	3	0	0	0	0	6

TOTAL NUMBER OF RECORDED ECHOES = 10

NUMBER OF ECHOES USED FOR STATISTICS = 6

AVERAGE BACKSCATTERING CROSS SECTION = .6891E-04 IN dB = -41.62

BACKSCATTERING CROSS SECTION STD DEV = .7489E-04

AVERAGE TARGET STRENGTH IN dB = -43.89

TARGET STRENGTH STD DEV IN dB = 5.01

* ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 6
ESTIMATED VOLUME IN CUBIC METERS = .3216+07
DENSITY IN FISH PER CUBIC METER = .187E-05

FILE NUMBER 1 = a:t57a.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	1	0	0	0	0	0	0	0	1
-54	0	0	0	0	0	0	0	0	0	0	0
-52	2	0	1	0	0	0	0	0	0	0	3
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	2	0	0	0	0	0	0	0	0	2
-46	1	2	0	0	0	0	0	0	0	0	3
-44	0	0	0	0	0	0	0	0	0	0	0
-42	1	0	0	0	0	0	0	0	0	0	1
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	4	4	2	0	0	0	0	0	0	0	10

TOTAL NUMBER OF RECORDED ECHOES = 16

NUMBER OF ECHOES USED FOR STATISTICS = 10

AVERAGE BACKSCATTERING CROSS SECTION = .1753E-04 IN dB = -47.56

BACKSCATTERING CROSS SECTION STD DEV = .1484E-04

AVERAGE TARGET STRENGTH IN dB = -49.01

TARGET STRENGTH STD DEV IN dB = 3.90

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 10
ESTIMATED VOLUME IN CUBIC METERS = .2296+07
DENSITY IN FISH PER CUBIC METER = .4186-05

```
FILE NUMBER  1 = a:t57d.001
NO TARGETS FOUND

--------------------------------------------------------------------------------

SUMMARY OF DATA FROM DEPTH     .0 TO  60.0
 NO TARGETS FOUND
```

FILE NUMBER 1 = a:t58d.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 / TO 6.00	6.00 / 12.00	12.00 / 18.00	18.00 / 24.00	24.00 / 30.00	30.00 / 36.00	36.00 / 42.00	42.00 / 48.00	48.00 / 54.00	54.00 / 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	1	0	0	0	0	0	0	0	0	1
-64	0	1	0	0	0	0	0	0	0	0	1
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	1	0	0	0	0	0	0	0	0	1
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	3	0	0	0	0	0	0	0	0	3

TOTAL NUMBER OF RECORDED ECHOES = 4

NUMBER OF ECHOES USED FOR STATISTICS = 3

AVERAGE BACKSCATTERING CROSS SECTION = .1008E-04 IN dB = -49.96

BACKSCATTERING CROSS SECTION STD DEV = .1685E-04

AVERAGE TARGET STRENGTH IN dB = -58.14

TARGET STRENGTH STD DEV IN dB = 11.22

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 3
ESTIMATED VOLUME IN CUBIC METERS = .406E+07
DENSITY IN FISH PER CUBIC METER = .738E-06

FILE NUMBER 1 = a:t59s.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	1	0	0	0	0	0	0	0	0	1
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	1	0	0	0	0	0	0	0	1
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	2	1	1	0	0	0	0	0	0	4
-48	0	2	5	0	0	0	0	0	0	0	7
-46	0	1	0	0	0	0	0	0	0	0	1
-44	0	0	1	0	0	0	0	0	0	0	1
-42	0	0	2	0	0	0	0	0	0	0	2
-40	0	1	1	0	0	0	0	0	0	0	2
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	7	12	1	0	0	0	0	0	0	20

TOTAL NUMBER OF RECORDED ECHOES = 23

NUMBER OF ECHOES USED FOR STATISTICS = 20

AVERAGE BACKSCATTERING CROSS SECTION = .3558E-04 IN dB = -44.49

BACKSCATTERING CROSS SECTION STD DEV = .4265E-04

AVERAGE TARGET STRENGTH IN dB = -47.14

TARGET STRENGTH STD DEV IN dB = 5.34

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 1

NUMBER OF FISH USED = 20
ESTIMATED VOLUME IN CUBIC METERS = .174E+07
DENSITY IN FISH PER CUBIC METER = .115E-04

FILE NUMBER 1 = a:t59d.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	1	0	0	0	0	0	0	1
-54	0	0	0	0	1	0	0	0	0	0	1
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	3	1	0	0	0	0	0	4
-46	0	0	0	1	1	0	0	0	0	0	2
-44	0	0	0	1	2	0	0	0	0	0	3
-42	0	0	0	3	1	0	0	0	0	0	4
-40	0	1	0	2	0	0	0	0	0	0	3
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	1	0	11	6	0	0	0	0	0	18

TOTAL NUMBER OF RECORDED ECHOES = 26

NUMBER OF ECHOES USED FOR STATISTICS = 18

AVERAGE BACKSCATTERING CROSS SECTION = .4422E-04 IN dB = -43.54

BACKSCATTERING CROSS SECTION STD DEV = .3619E-04

AVERAGE TARGET STRENGTH IN dB = -45.[illegible]

TARGET STRENGTH STD DEV IN dB = 4.51

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = * 18
ESTIMATED VOLUME IN CUBIC METERS = .368E+07
DENSITY IN FISH PER CUBIC METER = .489E-05

FILE NUMBER 1 = a:t60.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	1	0	0	0	0	0	1
-54	0	0	0	1	0	0	0	0	0	0	1
-52	0	0	0	1	1	0	0	0	0	0	2
-50	0	1	0	0	0	0	0	0	0	0	1
-48	1	0	0	0	2	0	0	0	0	0	3
-46	0	1	0	0	2	0	0	0	0	0	3
-44	0	0	2	2	0	0	0	0	0	0	4
-42	0	1	0	4	1	0	0	0	0	0	6
-40	0	0	1	1	0	0	0	0	0	0	2
-38	0	0	0	1	0	0	0	0	0	0	1
-36	0	0	0	1	0	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	1	0	0	0	0	0	0	1
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	3	3	12	7	0	0	0	0	0	26

TOTAL NUMBER OF RECORDED ECHOES = 31

NUMBER OF ECHOES USED FOR STATISTICS = 26

AVERAGE BACKSCATTERING CROSS SECTION = .6875E-04 IN dB = -41.63

BACKSCATTERING CROSS SECTION STD DEV = .1093E-03

AVERAGE TARGET STRENGTH IN dB = -44.17

TARGET STRENGTH STD DEV IN dB = 4.37

% ECHOES WITH BEAM PATTERN FACTORS @ dB= 0

NUMBER OF FISH USED = 26
ESTIMATED VOLUME IN CUBIC METERS = .369E+07
DENSITY IN FISH PER CUBIC METER = .705E-05

FILE NUMBER 1 = a:tbls.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	1	0	0	0	0	0	0	0	0	1
-46	0	1	0	0	0	0	0	0	0	0	1
-44	1	1	0	0	0	0	0	0	0	0	2
-42	0	1	0	0	0	0	0	0	0	0	1
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	4	0	0	0	0	0	0	0	0	5

TOTAL NUMBER OF RECORDED ECHOES = 15

NUMBER OF ECHOES USED FOR STATISTICS = 5

AVERAGE BACKSCATTERING CROSS SECTION = .3606E-04 IN dB = -44.43

BACKSCATTERING CROSS SECTION STD DEV = .2792E-04

AVERAGE TARGET STRENGTH IN dB = -45.19

TARGET STRENGTH STD DEV IN dB = 3.87

ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 1

NUMBER OF FISH USED = 5
ESTIMATED VOLUME IN CUBIC METERS = .220E+07
DENSITY IN FISH PER CUBIC METER = .227E-05

FILE NUMBER 1 = a:t6ld.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	1	0	0	0	0	0	0	1
-60	0	0	0	2	1	0	0	0	0	0	3
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	0	0	0	0	0	0	0	0
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	0	0	0	0	0	0	0	0	0	0
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	0	0	0	0	0	0	0	0	0
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	0	0	3	1	0	0	0	0	0	4

TOTAL NUMBER OF RECORDED ECHOES = 5

NUMBER OF ECHOES USED FOR STATISTICS = 4

AVERAGE BACKSCATTERING CROSS SECTION = .9071E-06 IN dB = -60.42

BACKSCATTERING CROSS SECTION STD DEV = .2281E-06

AVERAGE TARGET STRENGTH IN dB = -60.52

TARGET STRENGTH STD DEV IN dB = 1.08

* ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 0

NUMBER OF FISH USED = 4
ESTIMATED VOLUME IN CUBIC METERS = .216E+06
DENSITY IN FISH PER CUBIC METER = .185E-04

FILE NUMBER 1 = a:t62s.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	1	0	0	0	0	0	0	0	1
-60	0	0	1	0	0	0	0	0	0	0	1
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	1	3	0	0	0	0	0	0	0	4
-54	0	0	2	0	0	0	0	0	0	0	2
-52	0	0	4	0	0	0	0	0	0	0	4
-50	0	0	1	0	0	0	0	0	0	0	1
-48	0	0	0	0	0	0	0	0	0	0	0
-46	0	1	0	0	0	0	0	0	0	0	1
-44	0	0	0	0	0	0	0	0	0	0	0
-42	0	0	1	0	0	0	0	0	0	0	1
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	3	14	0	0	0	0	0	0	0	17

TOTAL NUMBER OF RECORDED ECHOES = 19

NUMBER OF ECHOES USED FOR STATISTICS = 17

AVERAGE BACKSCATTERING CROSS SECTION = .1741E-04 IN dB = -47.5*

BACKSCATTERING CROSS SECTION STD DEV = .3634E-04

AVERAGE TARGET STRENGTH IN dB = -50.8*

TARGET STRENGTH STD DEV IN dB = 4.2*

* ECHOES WITH BEAM PATTERN FACTORS > 0 dB= 1

NUMBER OF FISH USED = 17
ESTIMATED VOLUME IN CUBIC METERS = .112E+07
DENSITY IN FISH PER CUBIC METER = .152E-04

FILE NUMBER 1 = a:t62d.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	1	0	0	0	0	0	0	1
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	2	0	0	0	0	0	0	2
-52	0	0	0	0	0	0	0	0	0	0	0
-50	0	0	0	1	0	0	0	0	0	0	1
-48	0	1	1	2	0	0	0	0	0	0	4
-46	0	0	0	4	0	0	0	0	0	0	4
-44	0	1	1	3	0	0	0	0	0	0	5
-42	0	0	1	1	0	0	0	0	0	0	2
-40	0	1	0	0	0	0	0	0	0	0	1
-38	0	0	1	0	0	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	1	0	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	4	4	14	0	0	0	0	0	0	22

TOTAL NUMBER OF RECORDED ECHOES = 30

NUMMER OF ECHOES USED FOR STATISTICS = 22

AVERAGE BACKSCATTERING CROSS SECTION = .5802E-04 IN dB = -42.36

BACKSCATTERING CROSS SECTION STD DEV = .1033E-03

AVERAGE TARGET STRENGTH IN dB = -46.03

TARGET STRENGTH STD DEV IN dB = 6.33

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 0

NUMBER OF FISH USED = 22
ESTIMATED VOLUME IN CUBIC METERS = .522E+07
DENSITY IN FISH PER CUBIC METER = .422E-05

FILE NUMBER 1 = a:ta3.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	1	0	0	0	0	0	0	0	0	0	1
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	1	0	0	0	0	0	0	0	1
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	1	0	0	0	0	0	0	0	1
-52	0	0	0	1	0	0	0	0	0	0	1
-50	0	0	1	0	0	0	0	0	0	0	1
-48	0	0	1	0	0	0	0	0	0	0	1
-46	0	0	1	1	0	0	0	0	0	0	2
-44	0	0	2	0	0	0	0	0	0	0	2
-42	0	0	2	0	0	0	0	0	0	0	2
-40	0	0	0	0	0	0	0	0	0	0	0
-38	0	0	2	0	0	0	0	0	0	0	2
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	1	0	11	2	0	0	0	0	0	0	14

TOTAL NUMBER OF RECORDED ECHOES = 17

NUMBER OF ECHOES USED FOR STATISTICS = 14

AVERAGE BACKSCATTERING CROSS SECTION = .4435E-04 IN dB = -43.53

BACKSCATTERING CROSS SECTION STD DEV = .578aE-04

AVERAGE TARGET STRENGTH IN dB = -47.71

TARGET STRENGTH STD DEV IN dB = 7.57

ECHOES WITH BEAM PATTERN FACTORS = 0 dB= 0

NUMBER OF FISH USED = 14
ESTIMATED VOLUME IN CUBIC METERS = .81aE+07
DENSITY IN FISH PER CUBIC METER = .17IE-05

FILE NUMBER 1 = a:t64.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	2	0	0	0	0	0	0	0	0	2
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	0	2	0	0	0	0	0	0	2
-50	0	0	0	2	1	0	0	0	0	0	3
-48	0	0	1	1	0	0	0	0	0	0	2
-46	0	1	0	3	0	0	0	0	0	0	4
-44	0	0	3	0	0	0	0	0	0	0	3
-42	0	0	1	1	1	0	0	0	0	0	3
-40	0	1	0	2	0	0	0	0	0	0	3
-38	0	0	0	2	0	0	0	0	0	0	2
-36	0	0	0	0	1	0	0	0	0	0	1
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	4	5	13	3	0	0	0	0	0	25

TOTAL NUMBER OF RECORDED ECHOES = 33

NUMBER OF ECHOES USED FOR STATISTICS = 25

AVERAGE BACKSCATTERING CROSS SECTION = .5280E-04 IN dB = -42.77

BACKSCATTERING CROSS SECTION STD DEV = .6135E-04

AVERAGE TARGET STRENGTH IN dB = -45.94

TARGET STRENGTH STD DEV IN dB = 5.49

ECHOES WITH BEAM PATTERN FACTORS .0 dB= 0

NUMBER OF FISH USED = 25
ESTIMATED VOLUME IN CUBIC METERS = .745E+07
DENSITY IN FISH PER CUBIC METER = .336E-05

FILE NUMBER 1 = a:t65.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM .00 TO 6.00	6.00 12.00	12.00 18.00	18.00 24.00	24.00 30.00	30.00 36.00	36.00 42.00	42.00 48.00	48.00 54.00	54.00 60.00	SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	0	0	0	0	0	0	0	0	0	0
-56	0	0	0	0	0	0	0	0	0	0	0
-54	0	0	0	0	0	0	0	0	0	0	0
-52	0	0	1	0	1	0	0	0	0	0	2
-50	0	0	0	2	2	0	0	0	0	0	4
-48	0	0	0	1	1	0	0	0	0	0	2
-46	0	0	3	1	0	0	0	0	0	0	4
-44	0	1	1	2	0	0	0	0	0	0	4
-42	0	0	1	1	3	0	0	0	0	0	5
-40	0	0	2	1	1	0	0	0	0	0	4
-38	0	0	0	0	1	0	0	0	0	0	1
-36	0	0	0	0	0	0	0	0	0	0	0
-34	0	0	0	0	0	0	0	0	0	0	0
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	1	8	8	9	0	0	0	0	0	26

TOTAL NUMBER OF RECORDED ECHOES = 44

NUMBER OF ECHOES USED FOR STATISTICS = 26

AVERAGE BACKSCATTERING CROSS SECTION = .4579E-04 IN dB = -43.39

BACKSCATTERING CROSS SECTION STD DEV = .3720E-04

AVERAGE TARGET STRENGTH IN dB = -44.94

TARGET STRENGTH STD DEV IN dB = 3.90

ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 0

NUMBER OF FISH USED = 26
ESTIMATED VOLUME IN CUBIC METERS = .647E+07
DENSITY IN FISH PER CUBIC METER = .402E-05

FILE NUMBER 1 = a:t67.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

TS	FROM / TO	.00 / 6.00	6.00 / 12.00	12.00 / 18.00	18.00 / 24.00	24.00 / 30.00	30.00 / 36.00	36.00 / 42.00	42.00 / 48.00	48.00 / 54.00	54.00 / 60.00	SUM
-74	:	0	0	0	0	0	0	0	0	0	0	0
-72	:	0	0	0	0	0	0	0	0	0	0	0
-70	:	0	0	0	0	0	0	0	0	0	0	0
-68	:	0	0	0	0	0	0	0	0	0	0	0
-66	:	0	0	0	0	0	0	0	0	0	0	0
-64	:	0	0	0	0	0	0	0	0	0	0	0
-62	:	0	0	0	0	0	0	0	0	0	0	0
-60	:	0	0	0	0	0	0	0	0	0	0	0
-58	:	0	0	0	0	0	0	0	0	0	0	0
-56	:	2	0	0	0	0	0	0	0	0	0	2
-54	:	1	0	0	0	0	0	0	0	0	0	1
-52	:	0	0	0	0	0	0	0	0	0	0	0
-50	:	0	2	1	0	0	0	0	0	0	0	3
-48	:	0	0	1	0	0	0	0	0	0	0	1
-46	:	0	1	0	0	0	0	0	0	0	0	1
-44	:	0	1	0	0	0	0	0	0	0	0	1
-42	:	0	1	1	0	0	0	0	0	0	0	2
-40	:	0	1	0	0	0	0	0	0	0	0	1
-38	:	0	1	1	0	0	0	0	0	0	0	2
-36	:	0	0	0	0	0	0	0	0	0	0	0
-34	:	0	0	0	0	0	0	0	0	0	0	0
-32	:	0	0	0	0	0	0	0	0	0	0	0
-30	:	0	0	0	0	0	0	0	0	0	0	0
-28	:	0	0	0	0	0	0	0	0	0	0	0
-26	:	0	0	0	0	0	0	0	0	0	0	0
-24	:	0	0	0	0	0	0	0	0	0	0	0
-22	:	0	0	0	0	0	0	0	0	0	0	0
-20	:	0	0	0	0	0	0	0	0	0	0	0
-18	:	0	0	0	0	0	0	0	0	0	0	0
-16	:	0	0	0	0	0	0	0	0	0	0	0
SUM		3	7	4	0	0	0	0	0	0	0	14

TOTAL NUMBER OF RECORDED ECHOES = 20

NUMBER OF ECHOES USED FOR STATISTICS = 14

AVERAGE BACKSCATTERING CROSS SECTION = .4867E-04 IN dB = -43.1[illegible]

BACKSCATTERING CROSS SECTION STD DEV = .5512E-04

AVERAGE TARGET STRENGTH IN dB = -46.56

TARGET STRENGTH STD DEV IN dB = [illegible].74

ECHOES WITH BEAM PATTERN FACTORS 0 dB= 1

NUMBER OF FISH USED = 14
ESTIMATED VOLUME IN CUBIC METERS = .677E+07
DENSITY IN FISH PER CUBIC METER = .201E-05

FILE NUMBER 1 = a:t69.001

SUMMARY OF DATA FROM DEPTH .0 TO 60.0

DEPTH INTERVALS

FROM	.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	
TO	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	
TS											SUM
-74	0	0	0	0	0	0	0	0	0	0	0
-72	0	0	0	0	0	0	0	0	0	0	0
-70	0	0	0	0	0	0	0	0	0	0	0
-68	0	0	0	0	0	0	0	0	0	0	0
-66	0	0	0	0	0	0	0	0	0	0	0
-64	0	0	0	0	0	0	0	0	0	0	0
-62	0	0	0	0	0	0	0	0	0	0	0
-60	0	0	0	0	0	0	0	0	0	0	0
-58	0	1	0	0	0	0	0	0	0	0	1
-56	0	1	2	0	0	0	0	0	0	0	3
-54	0	0	3	0	0	0	0	0	0	0	3
-52	0	0	3	1	0	0	0	0	0	0	4
-50	0	0	1	0	0	0	0	0	0	0	1
-48	0	0	1	2	0	0	0	0	0	0	3
-46	0	0	2	4	0	0	0	0	0	0	6
-44	0	0	1	4	0	0	0	0	0	0	5
-42	0	2	2	2	0	0	0	0	0	0	6
-40	0	0	5	0	0	0	0	0	0	0	5
-38	0	1	1	2	0	0	0	0	0	0	4
-36	0	0	3	0	0	0	0	0	0	0	3
-34	0	1	0	0	0	0	0	0	0	0	1
-32	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	0	0	0	0	0	0	0	0
-28	0	0	0	0	0	0	0	0	0	0	0
-26	0	0	0	0	0	0	0	0	0	0	0
-24	0	0	0	0	0	0	0	0	0	0	0
-22	0	0	0	0	0	0	0	0	0	0	0
-20	0	0	0	0	0	0	0	0	0	0	0
-18	0	0	0	0	0	0	0	0	0	0	0
-16	0	0	0	0	0	0	0	0	0	0	0
SUM	0	6	24	15	0	0	0	0	0	0	45

TOTAL NUMBER OF RECORDED ECHOES = 59

NUMBER OF ECHOES USED FOR STATISTICS = 45

AVERAGE BACKSCATTERING CROSS SECTION = .7137E-04 IN dB = -41.46

BACKSCATTERING CROSS SECTION STD DEV = .9685E-04

AVERAGE TARGET STRENGTH IN dB = -40.04

TARGET STRENGTH STD DEV IN dB = 6.76

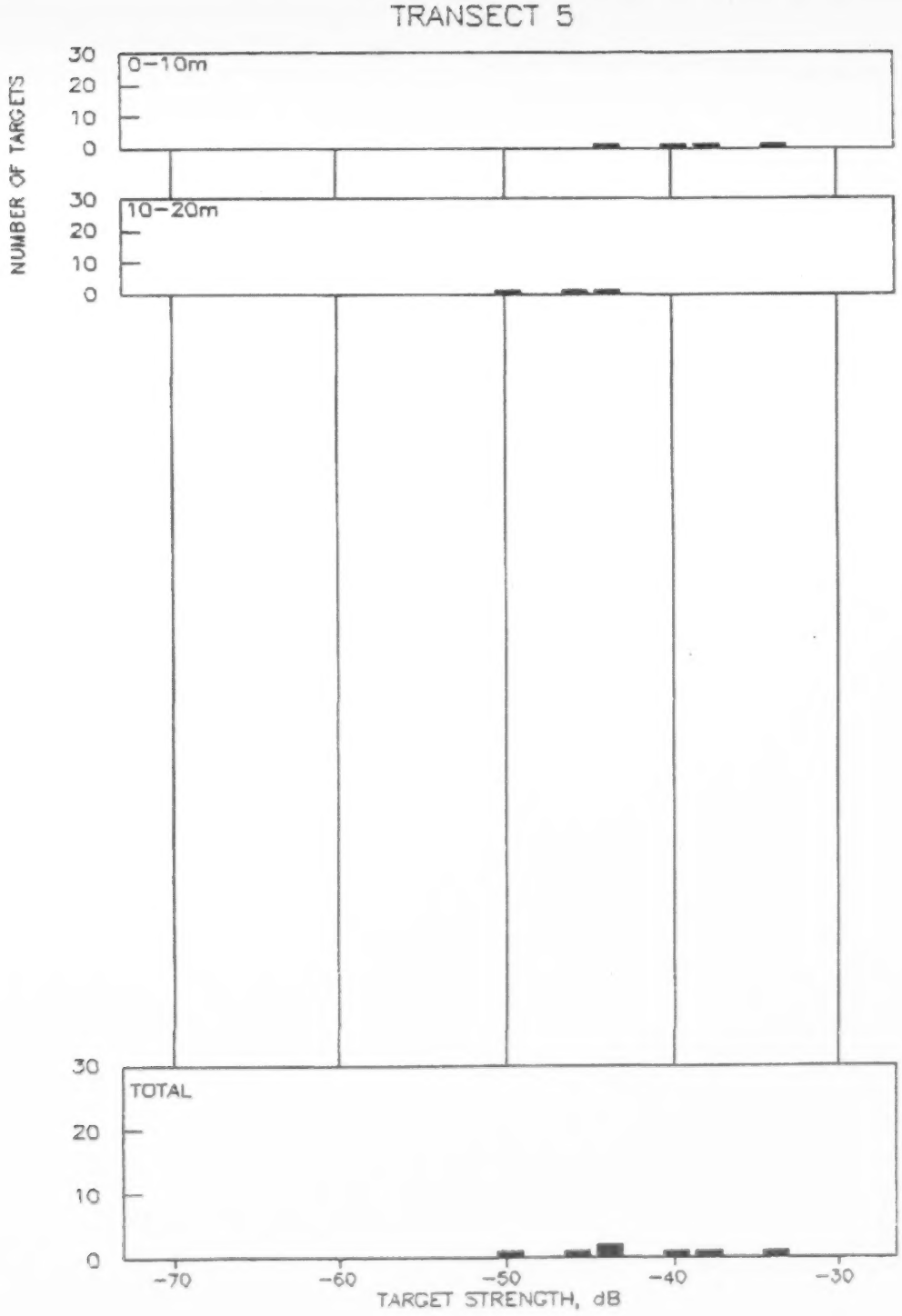
ECHOES WITH BEAM PATTERN FACTORS < 0 dB= 0

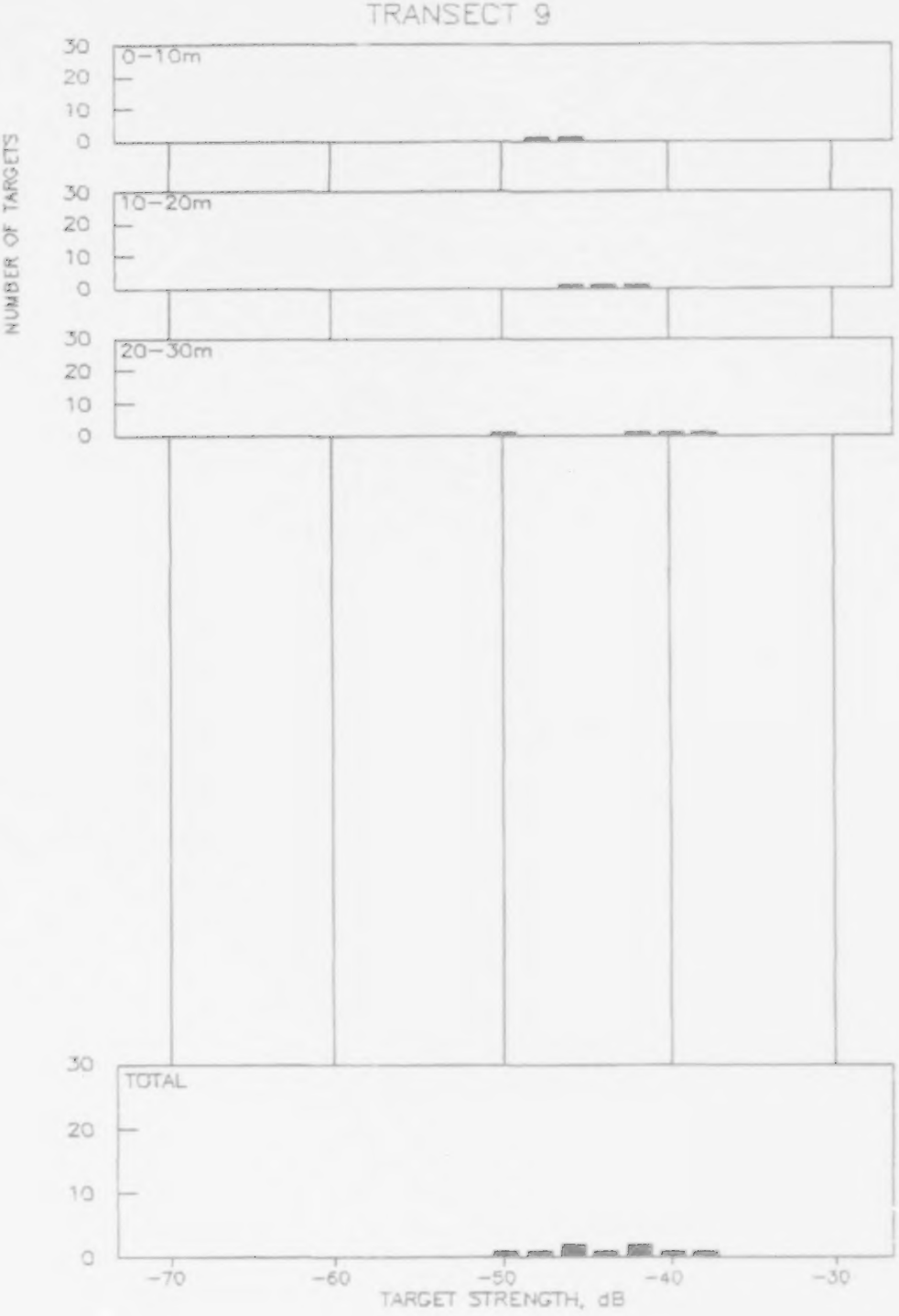
NUMBER OF FISH USED = 45
ESTIMATED VOLUME IN CUBIC METERS = .10BE+08
DENSITY IN FISH PER CUBIC METER = .41BE-05

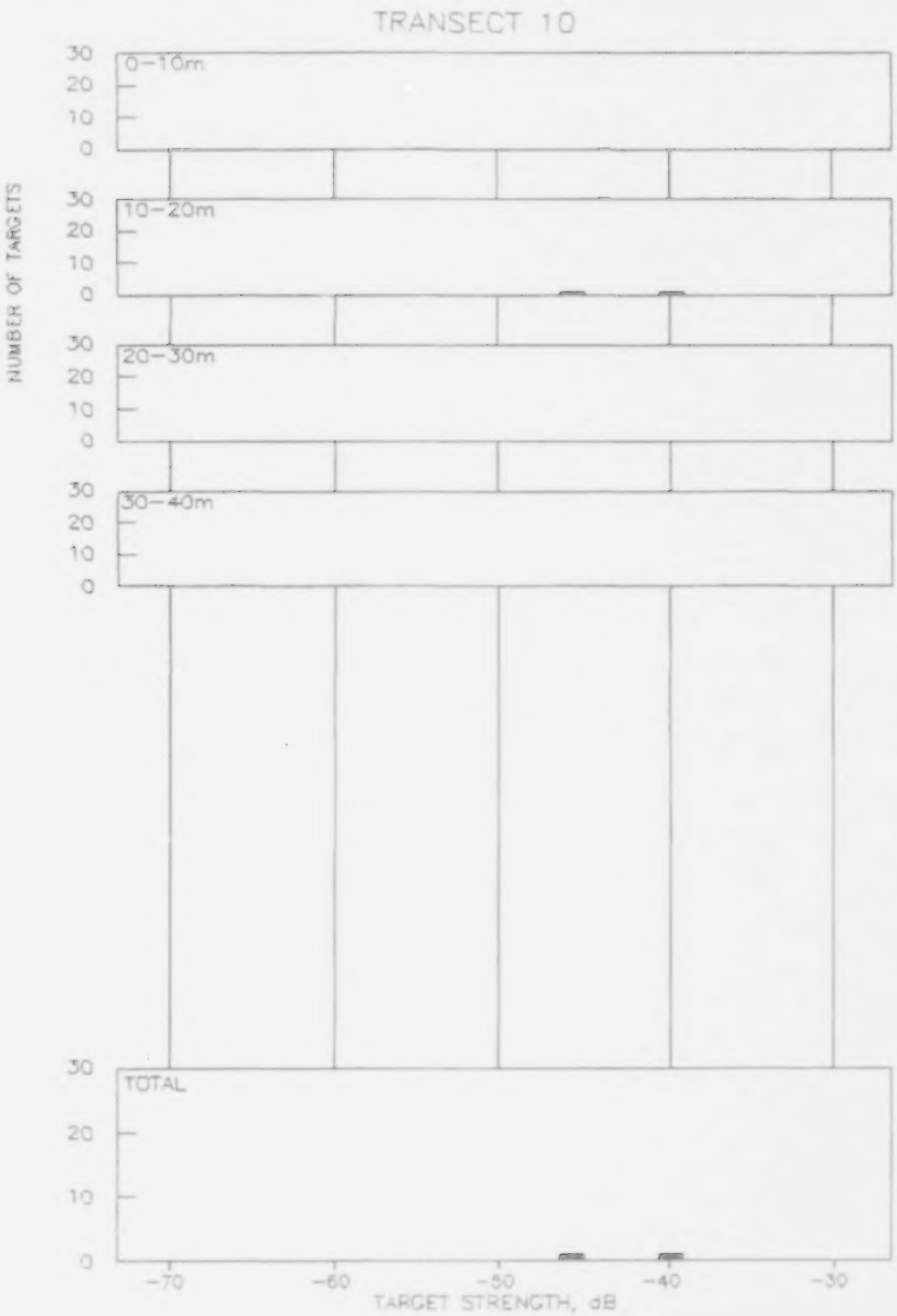
6.5 - Appendix E: Target strength vs depth histograms.

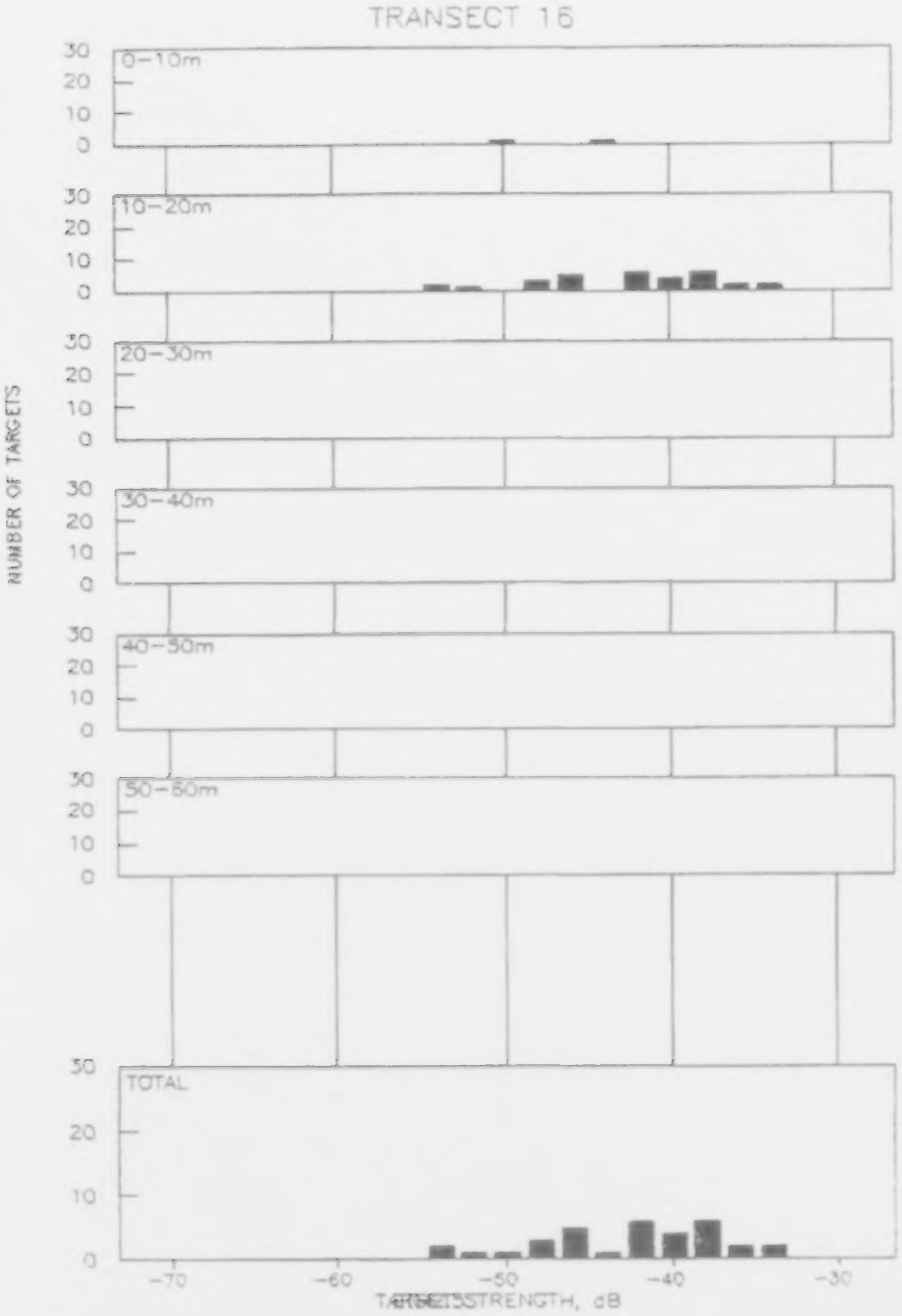
Histograms of acoustic target strengths by depths for hydro-acoustic surveys of Williston Lake, 1988.

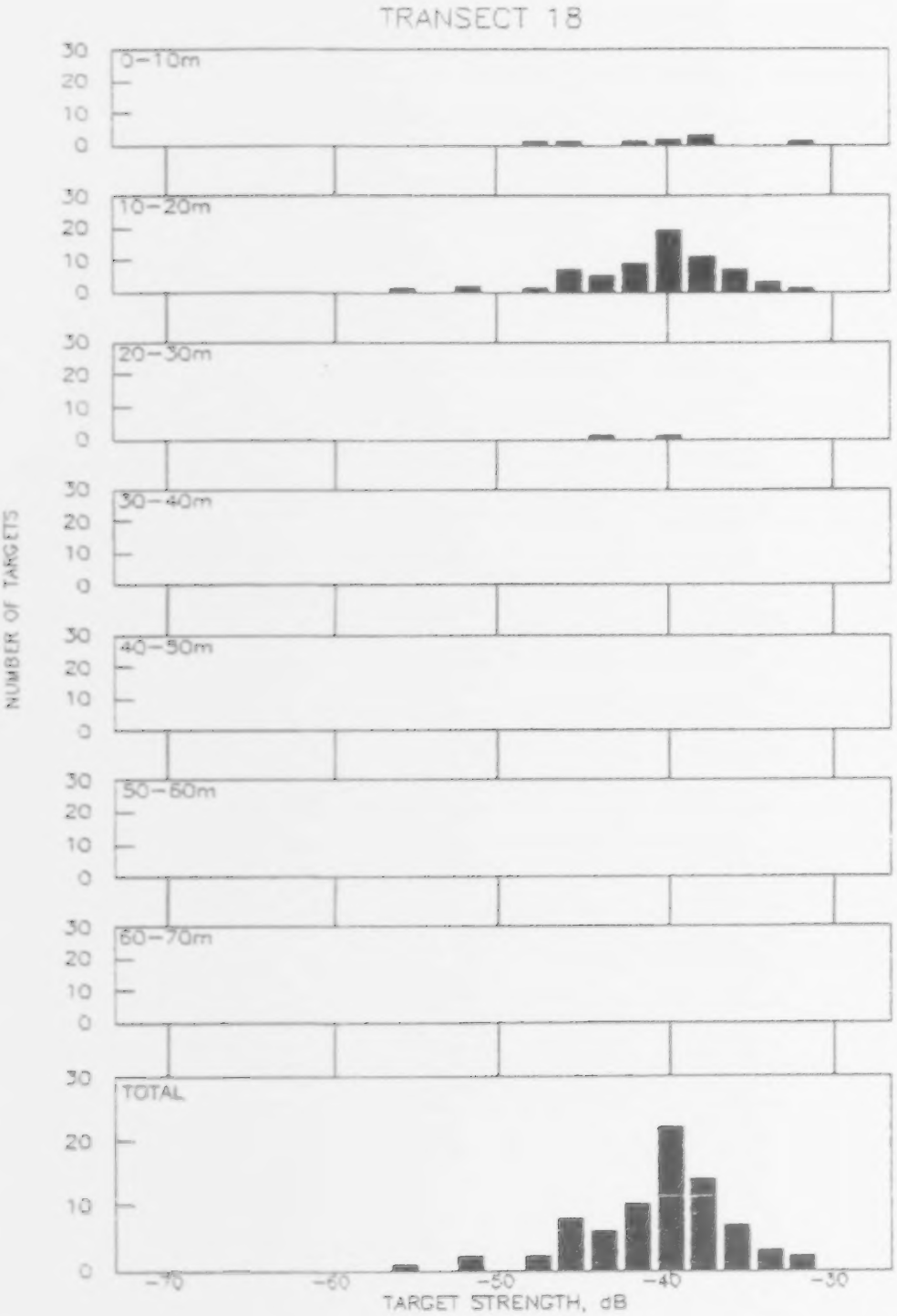
6.5.1 - Appendix E1 - June 1988

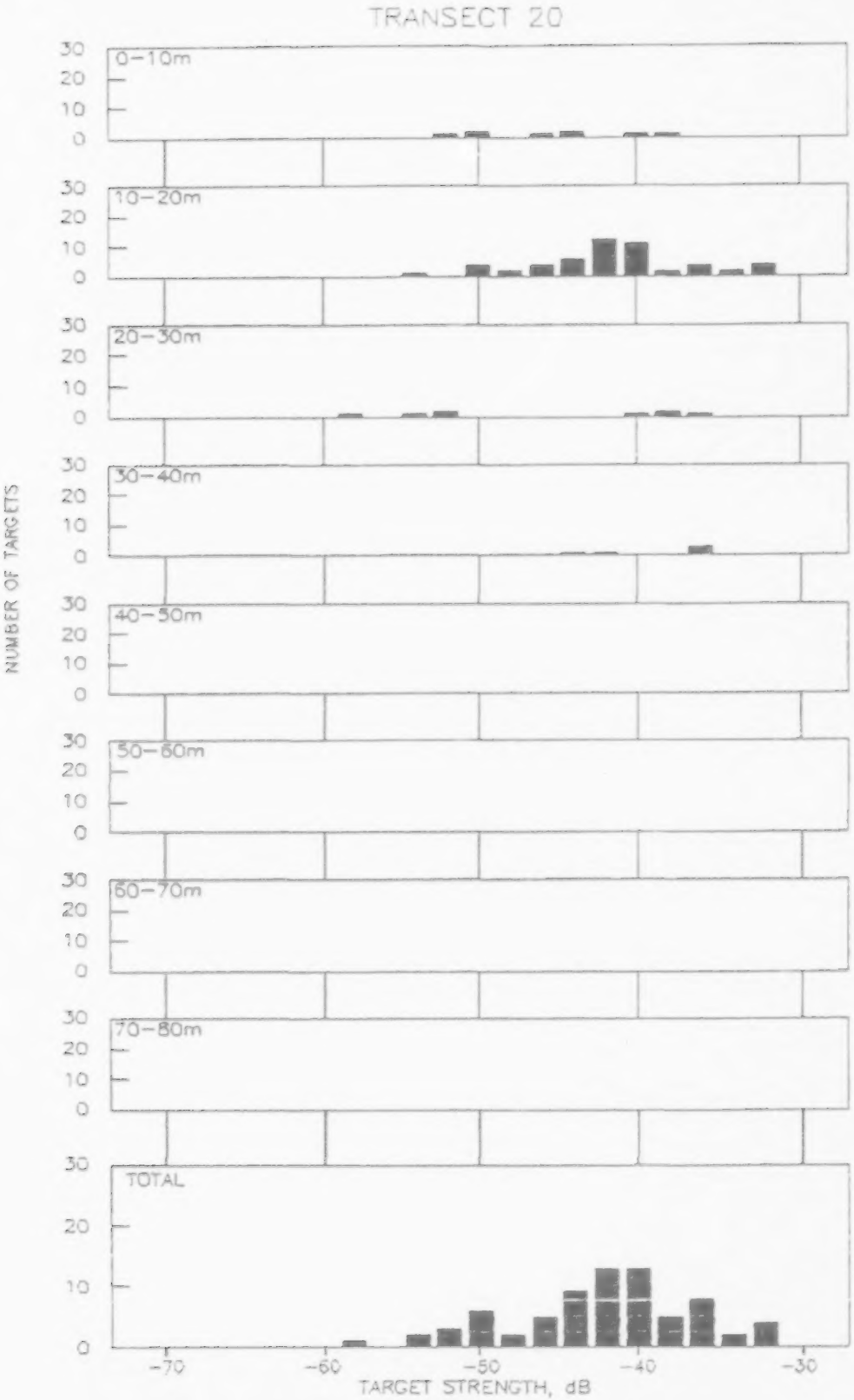

TRANSECT 5
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

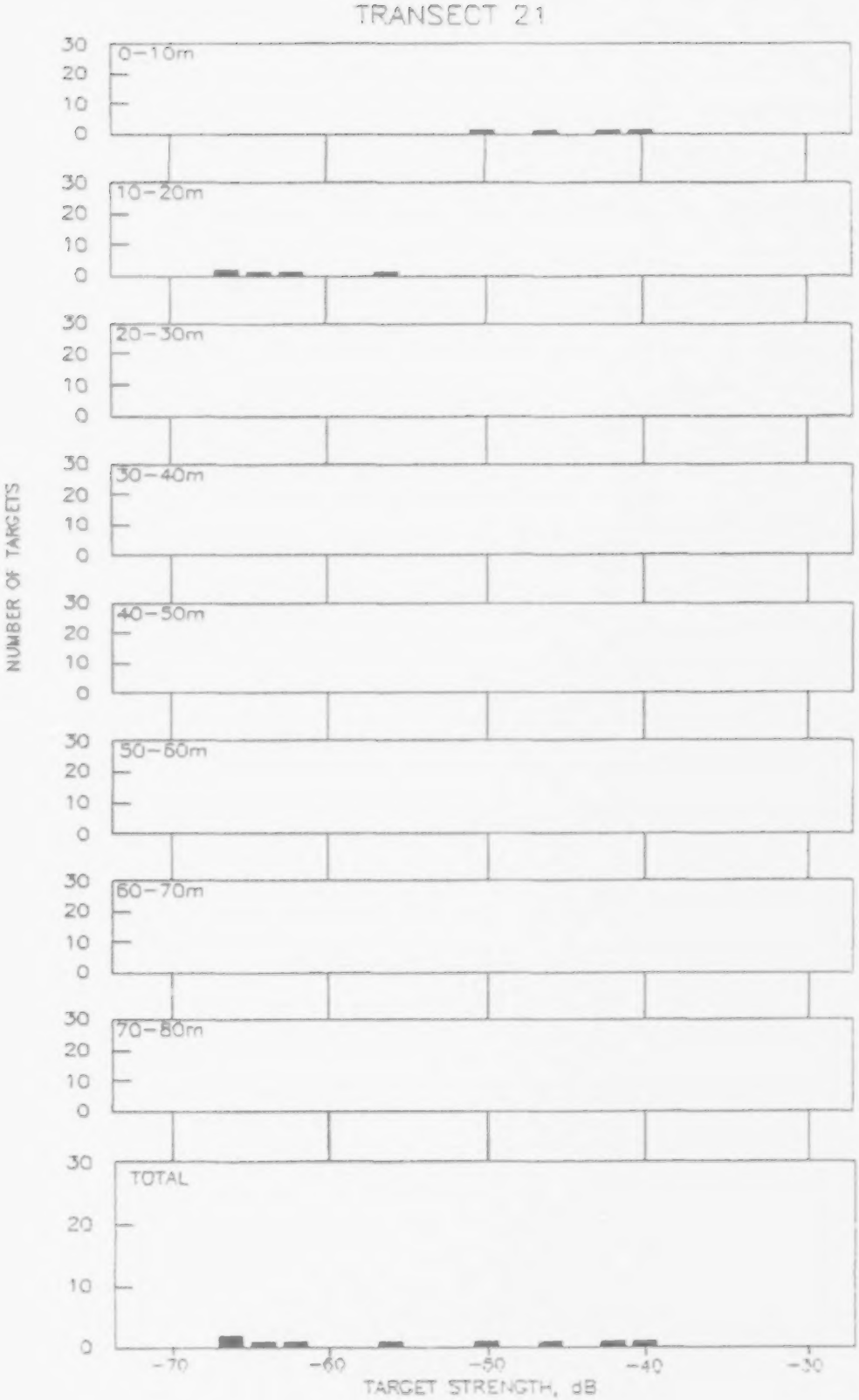

TRANSECT 9
NUMBER OF TARGETS
0–10m
10–20m
20–30m
TOTAL
30
20
10
0
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

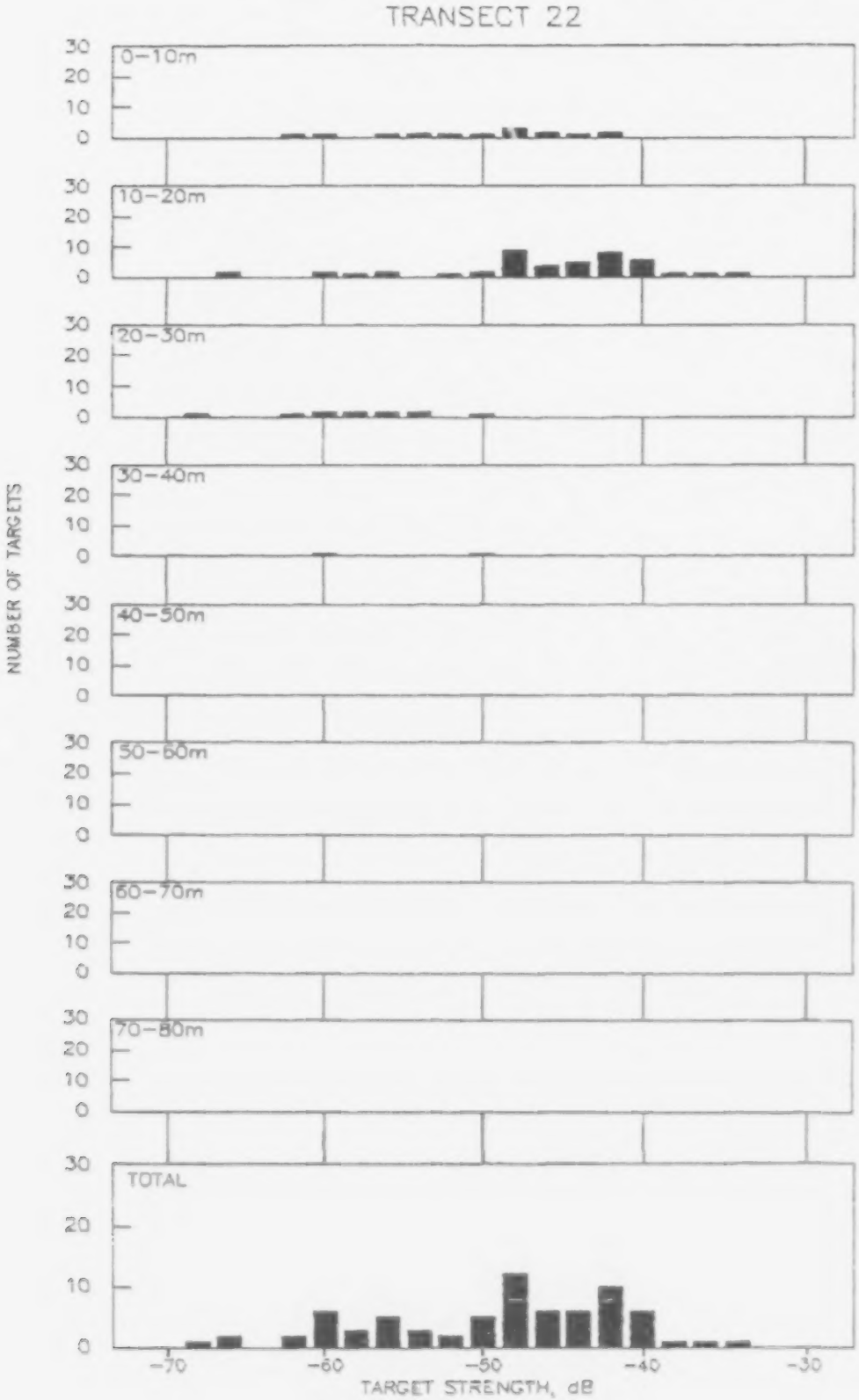

TRANSECT 10
NUMBER OF TARGETS
0–10m
10–20m
20–30m
30–40m
TOTAL
30
20
10
0
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

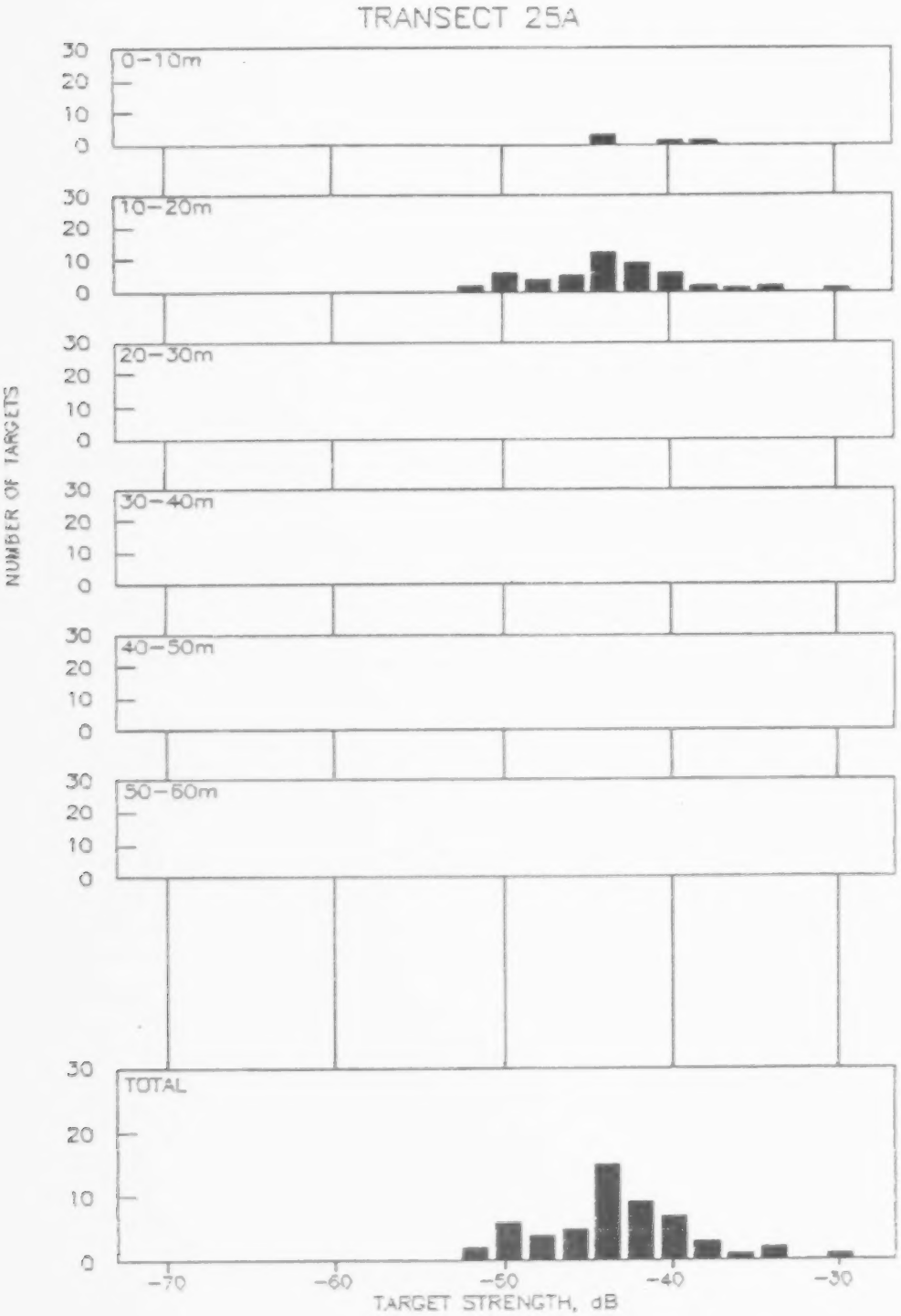

TRANSECT 16
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

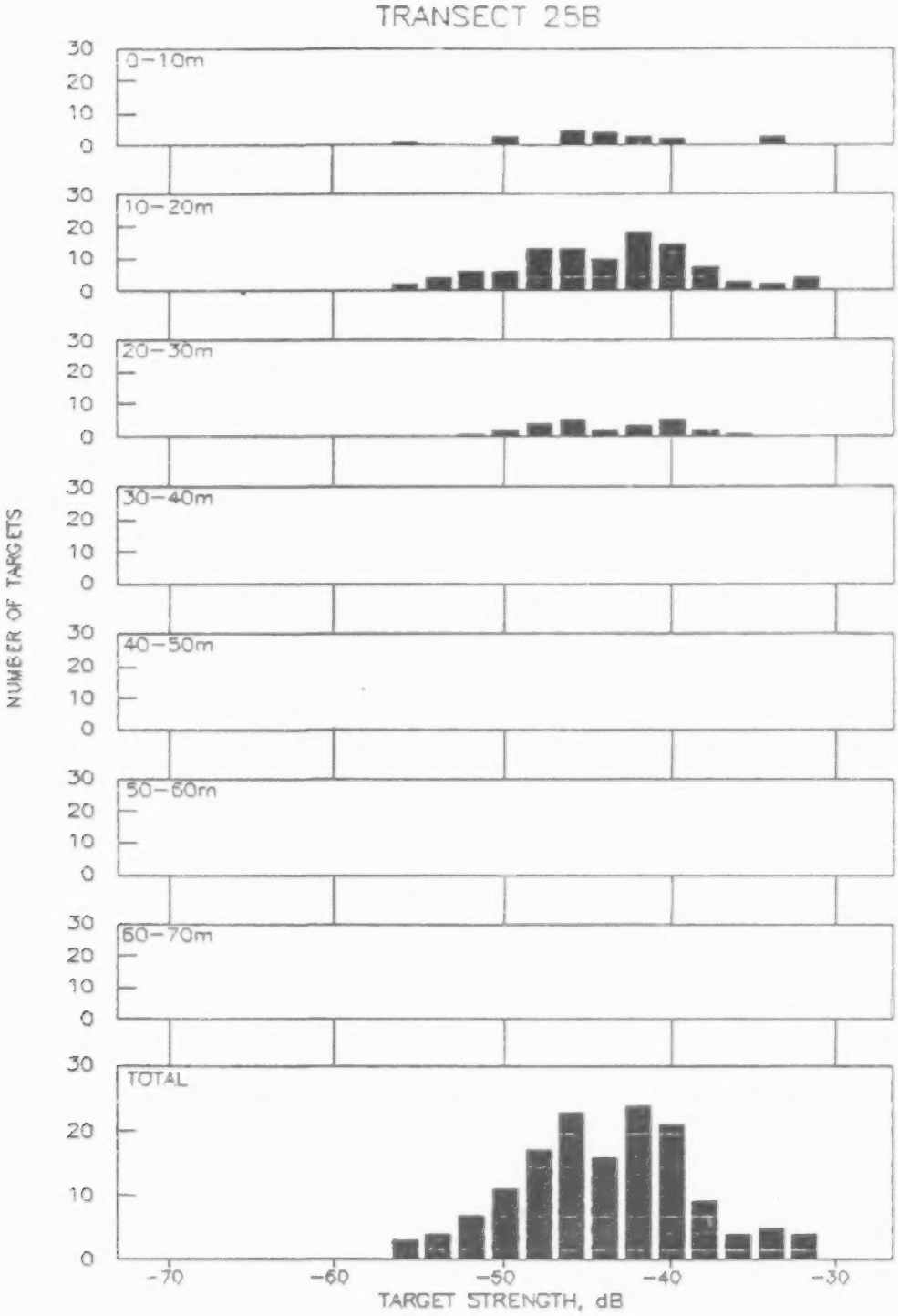

TRANSECT 18
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

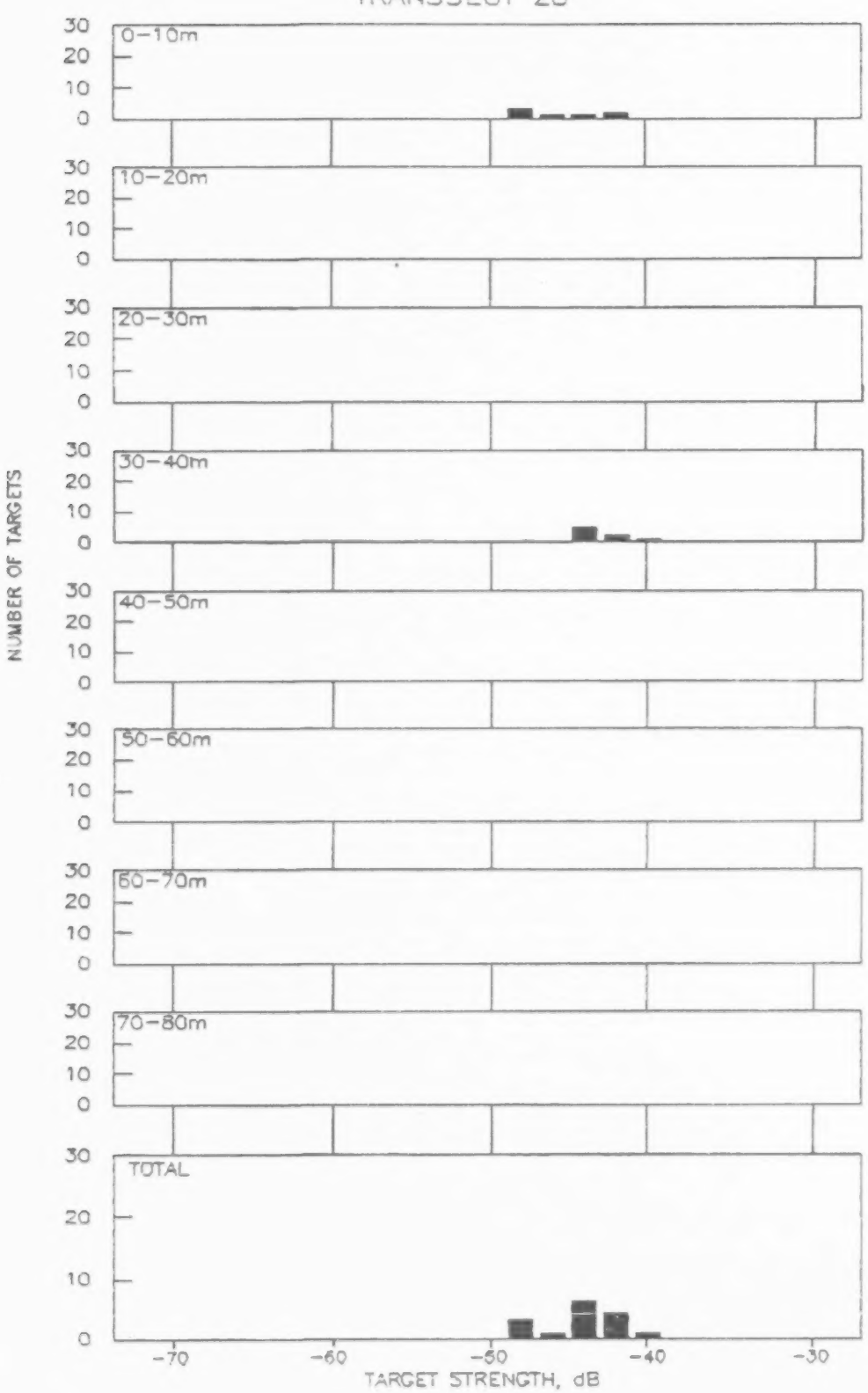

TRANSECT 20
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

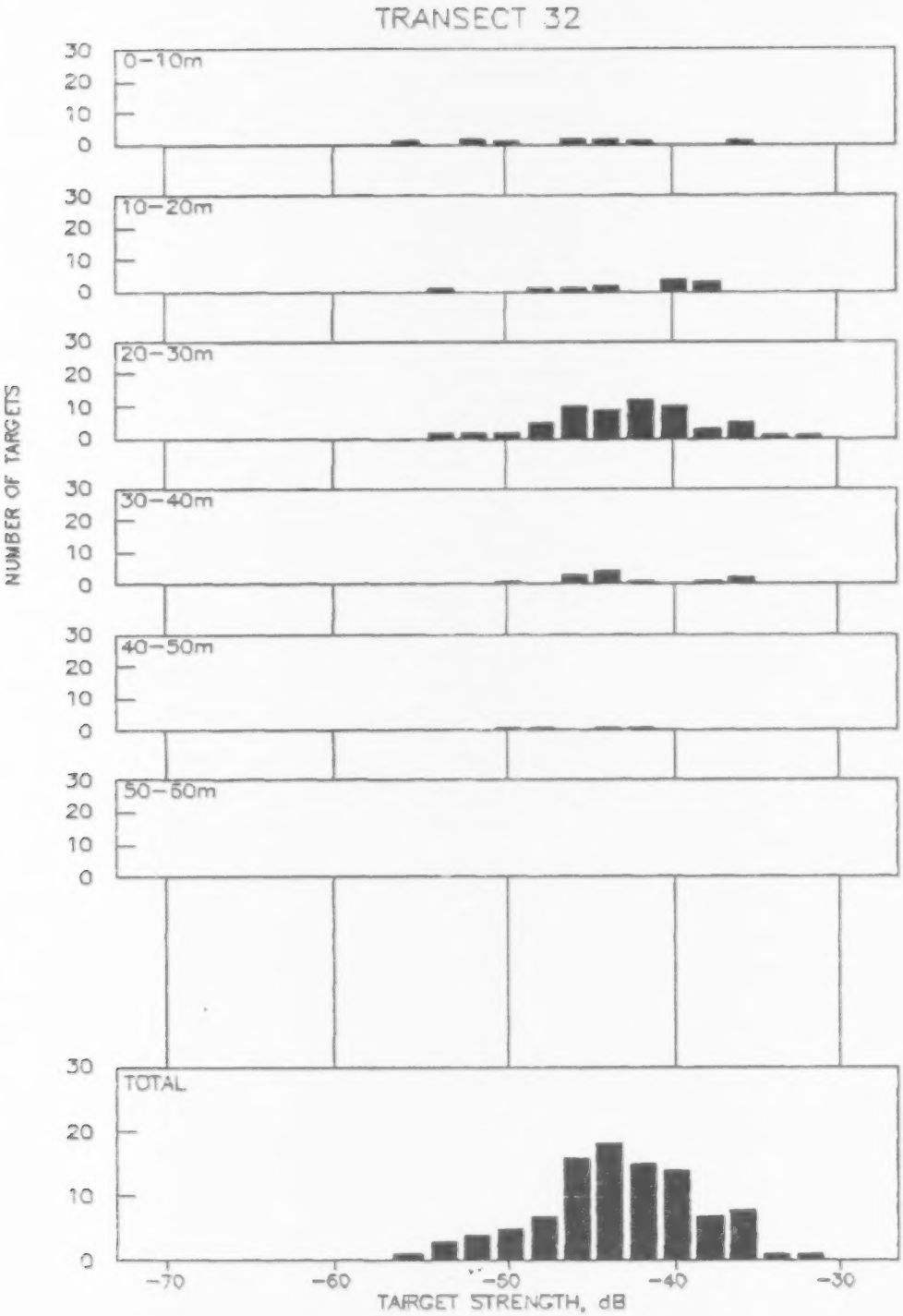

TRANSECT 21
0-10m
10-20m
20-30m
30-40m
40-50m
50-60m
60-70m
70-80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

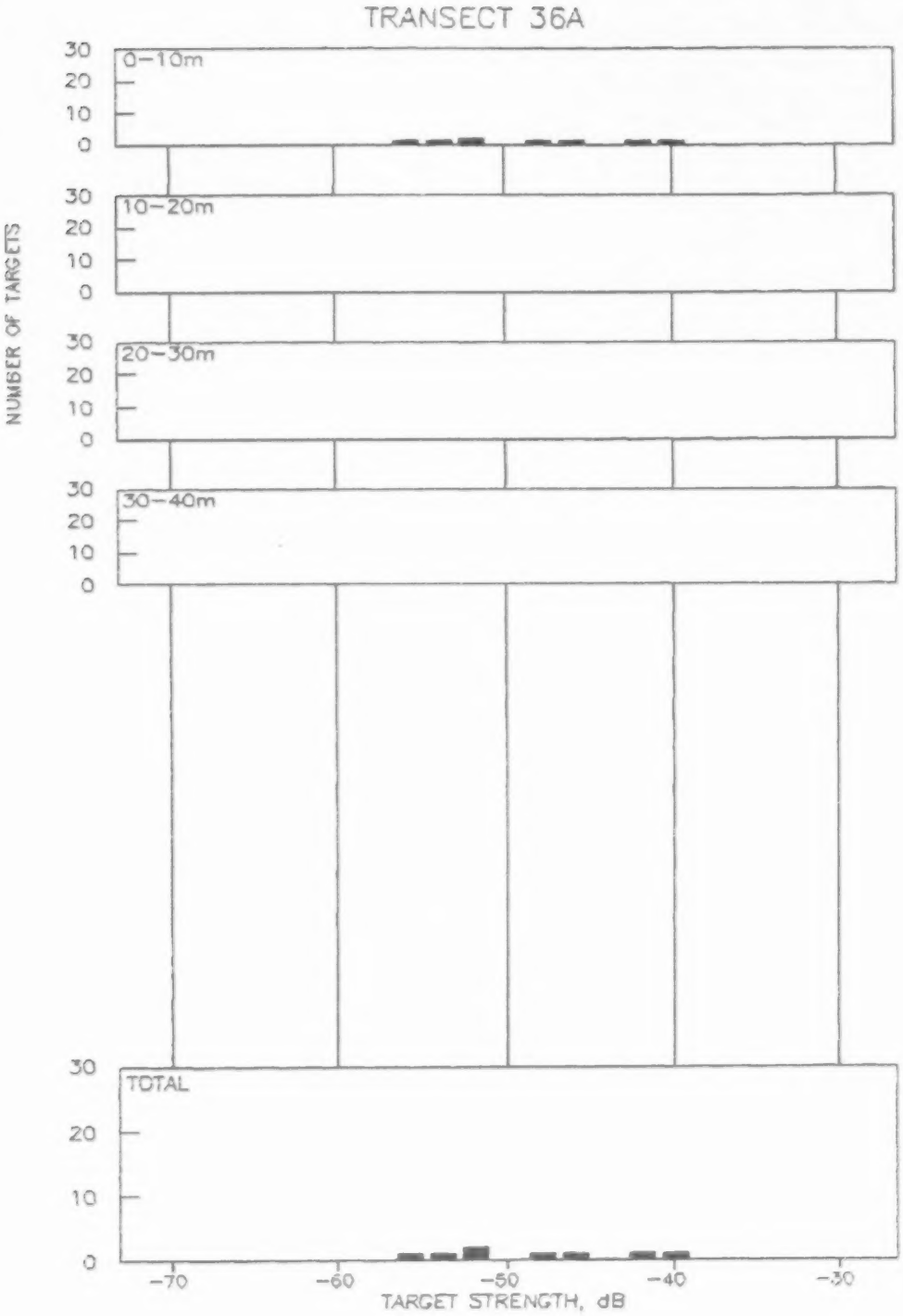

TRANSECT 22
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

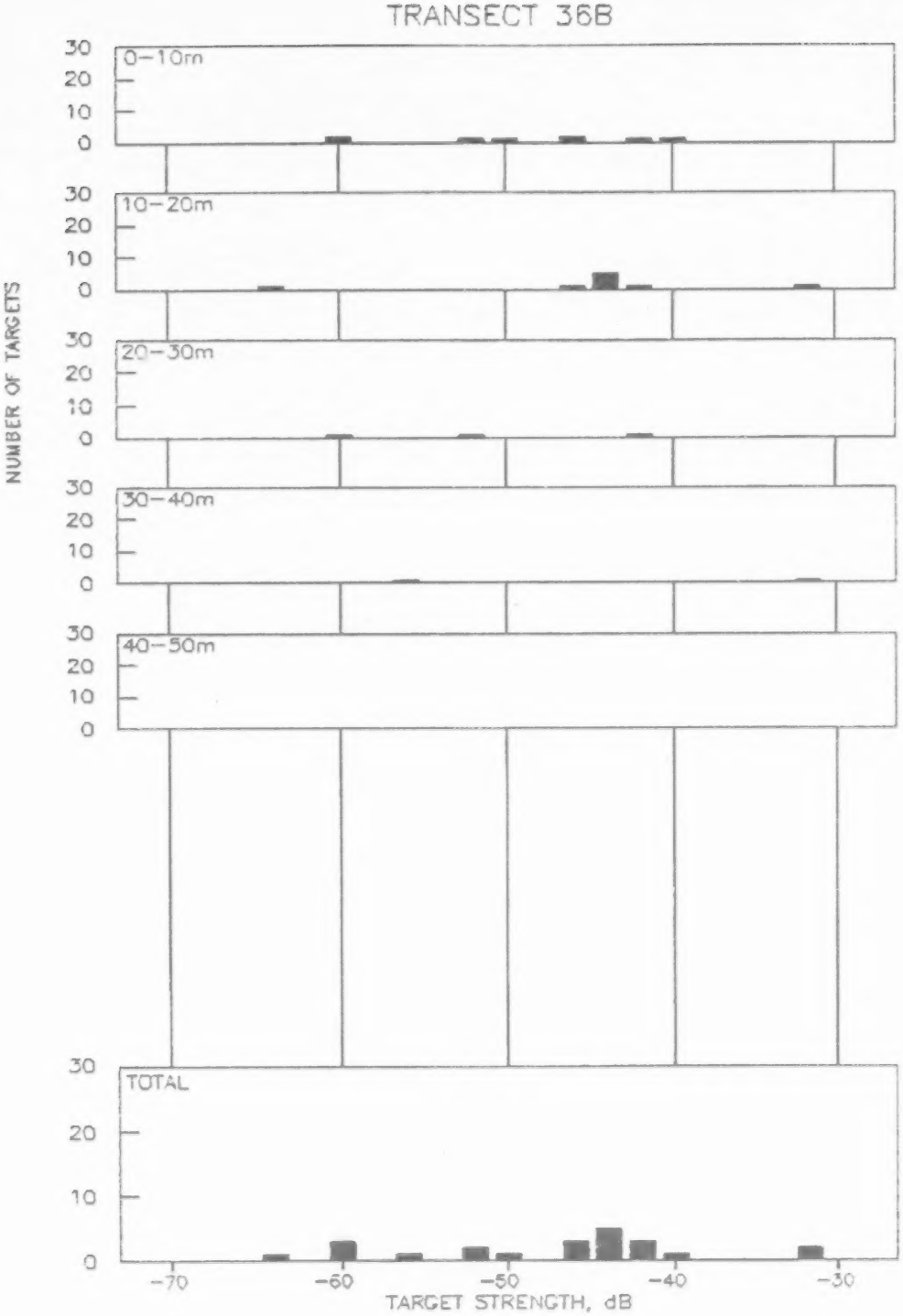

TRANSECT 25A
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

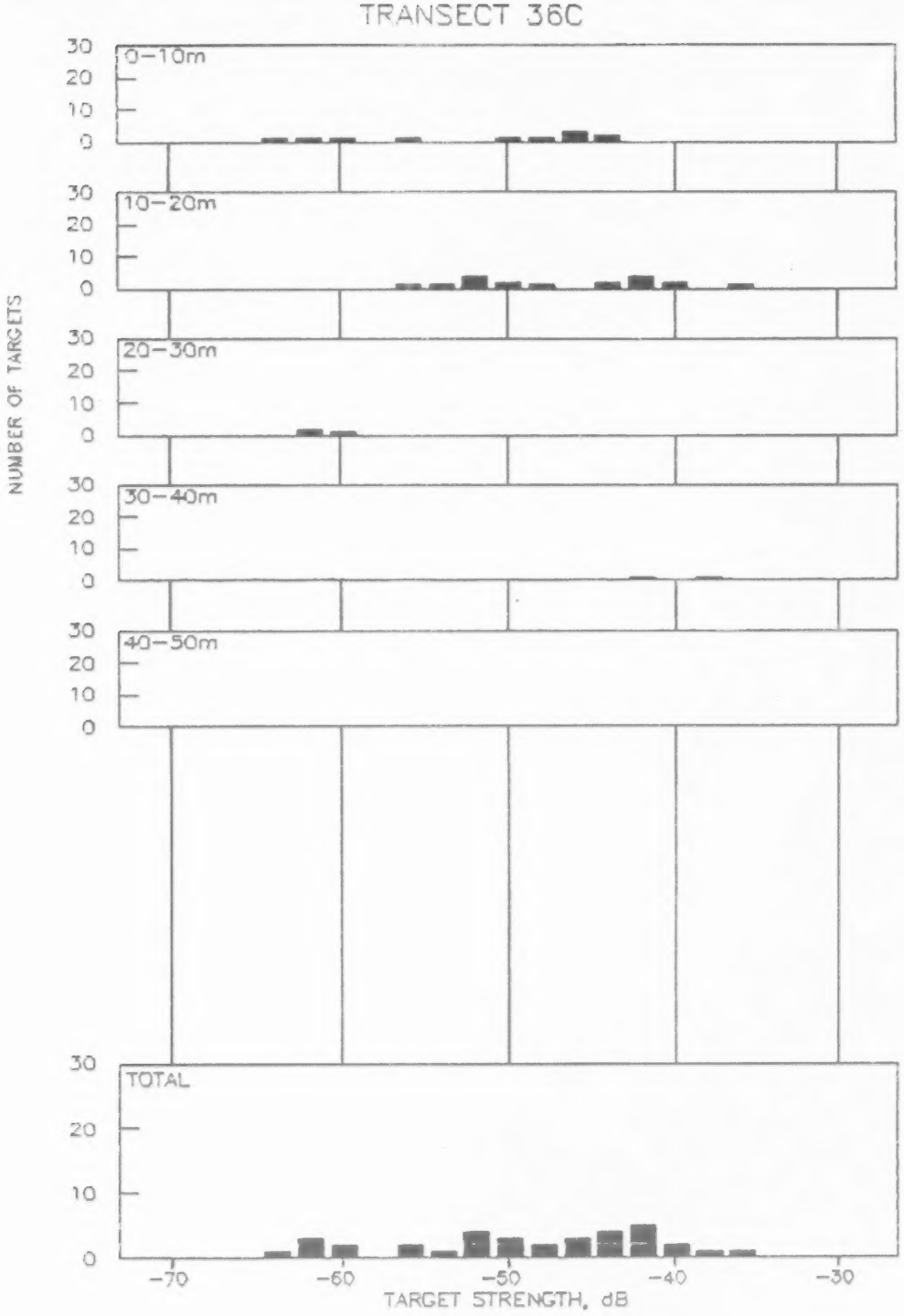

TRANSECT 25B
0-10m
10-20m
20-30m
30-40m
40-50m
50-60m
60-70m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

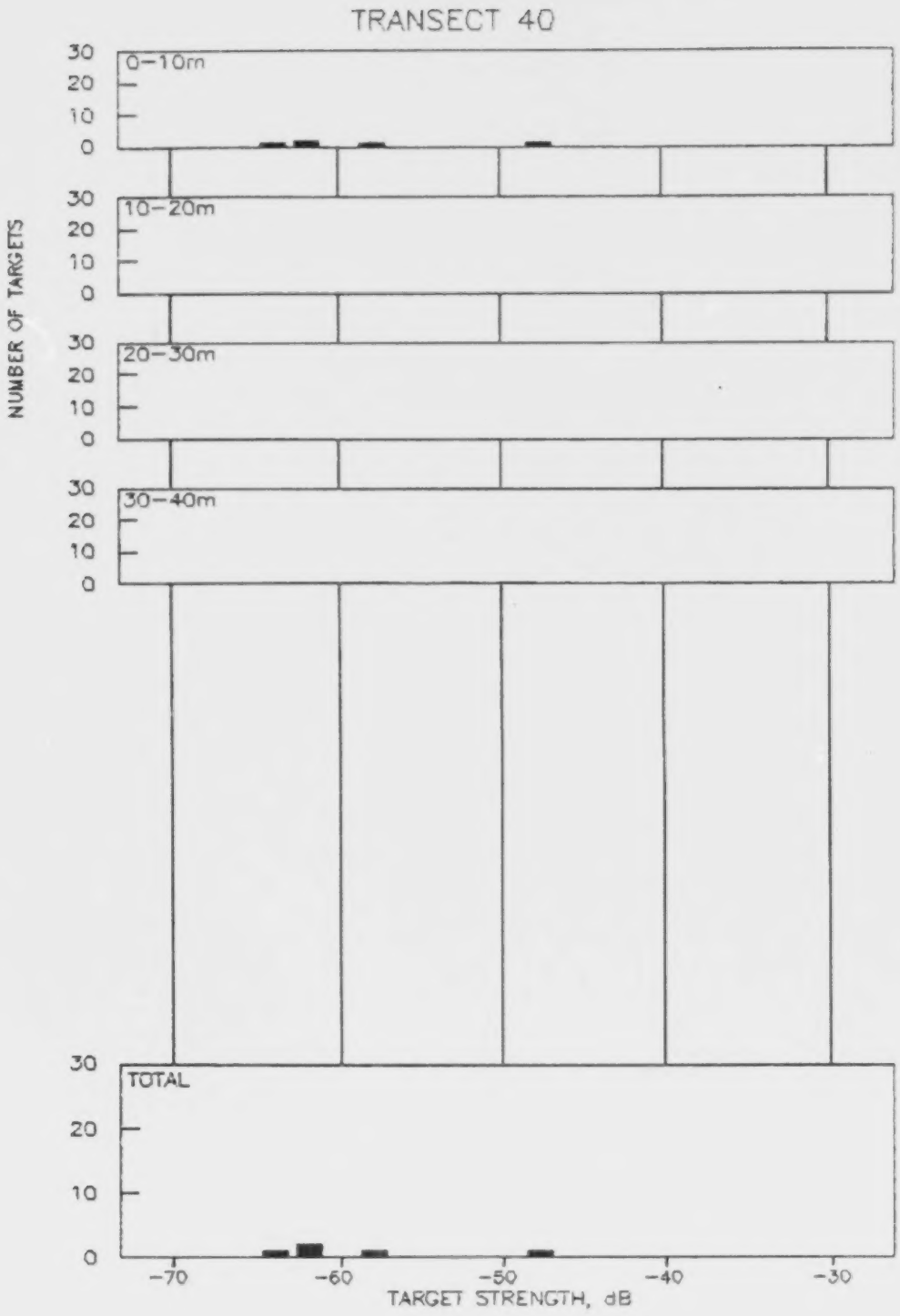

TRANSSECT 28
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

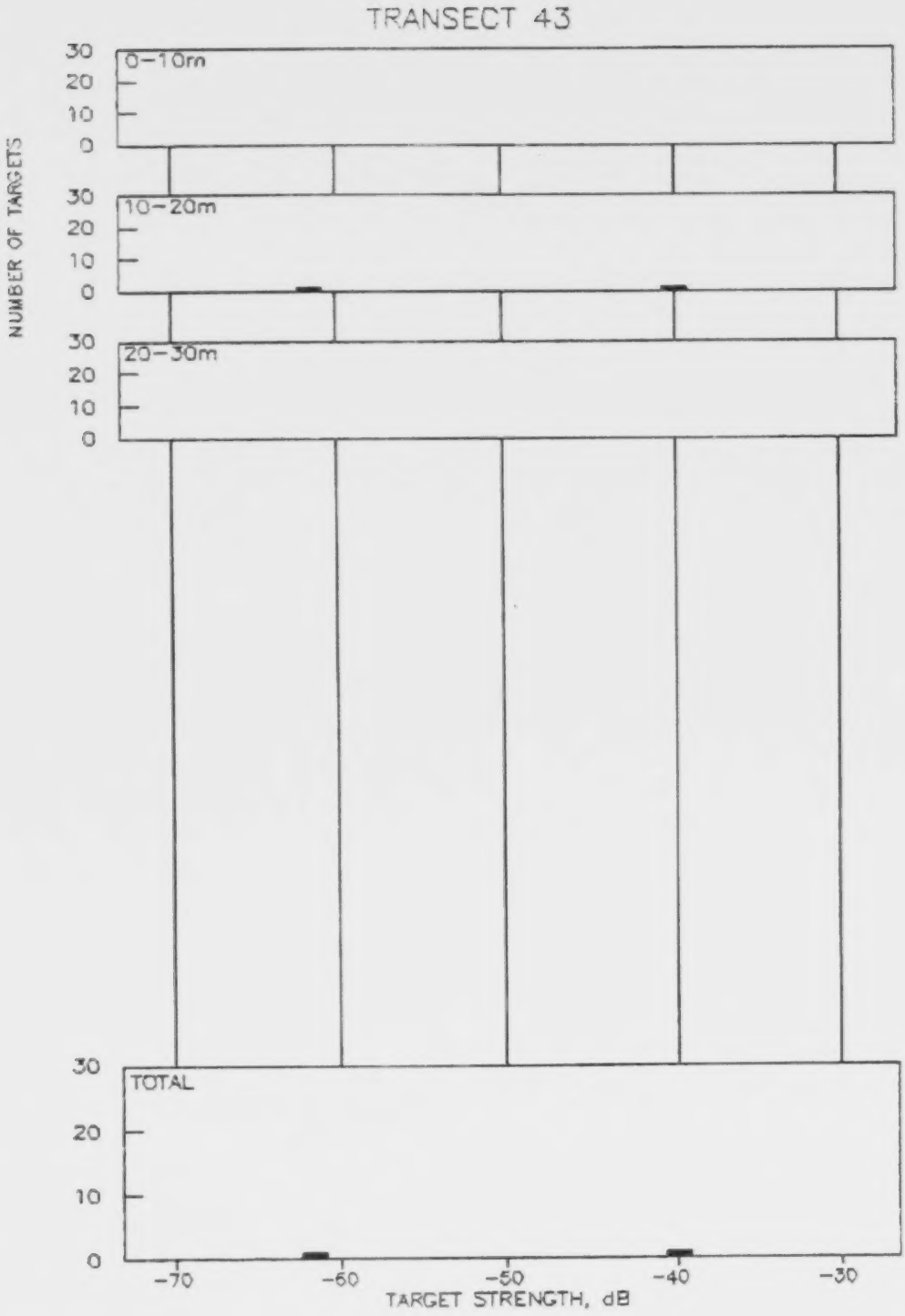

TRANSECT 32
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

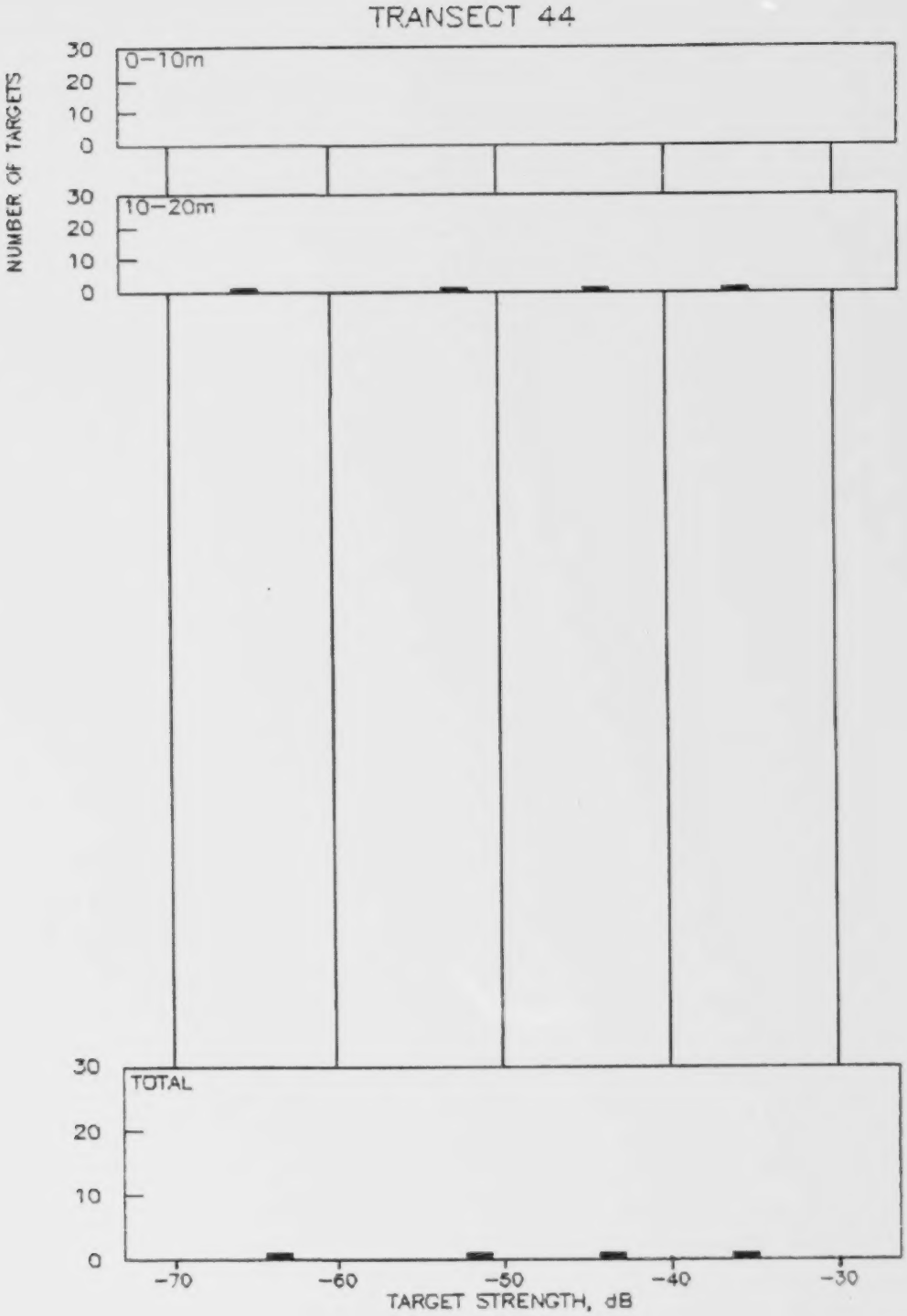

TRANSECT 36A
0–10m
10–20m
20–30m
30–40m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

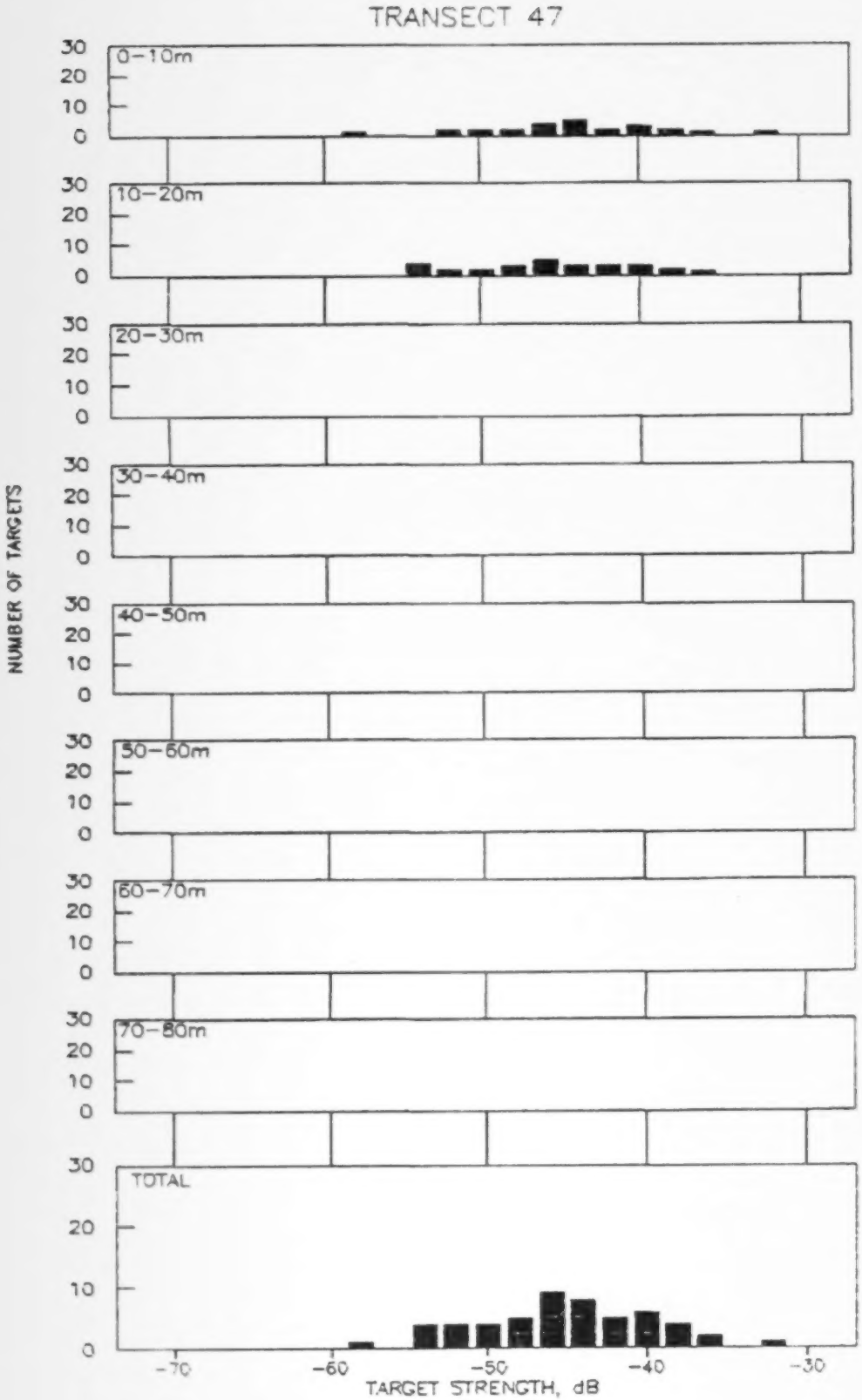

TRANSECT 36B
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

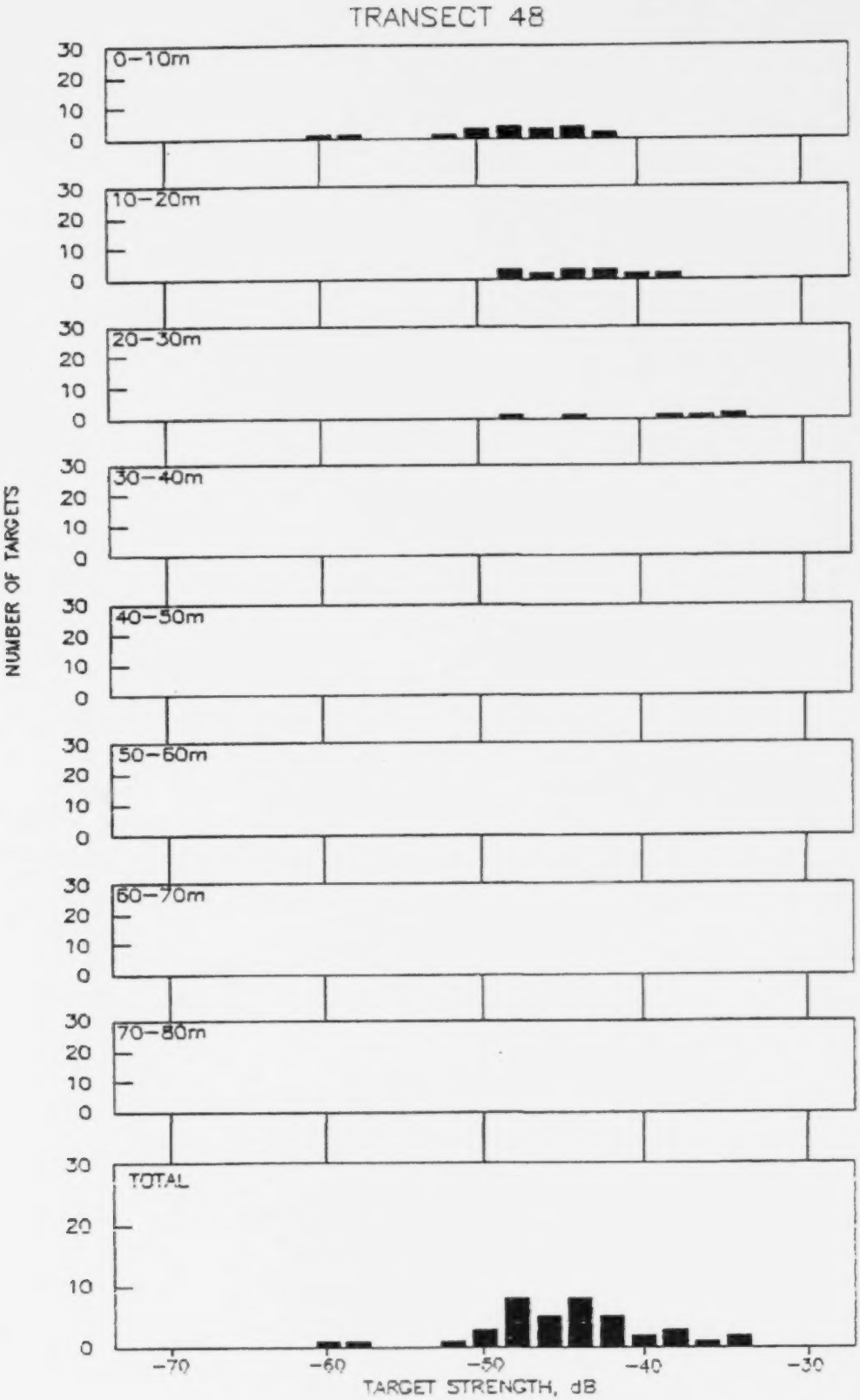

TRANSECT 36C
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

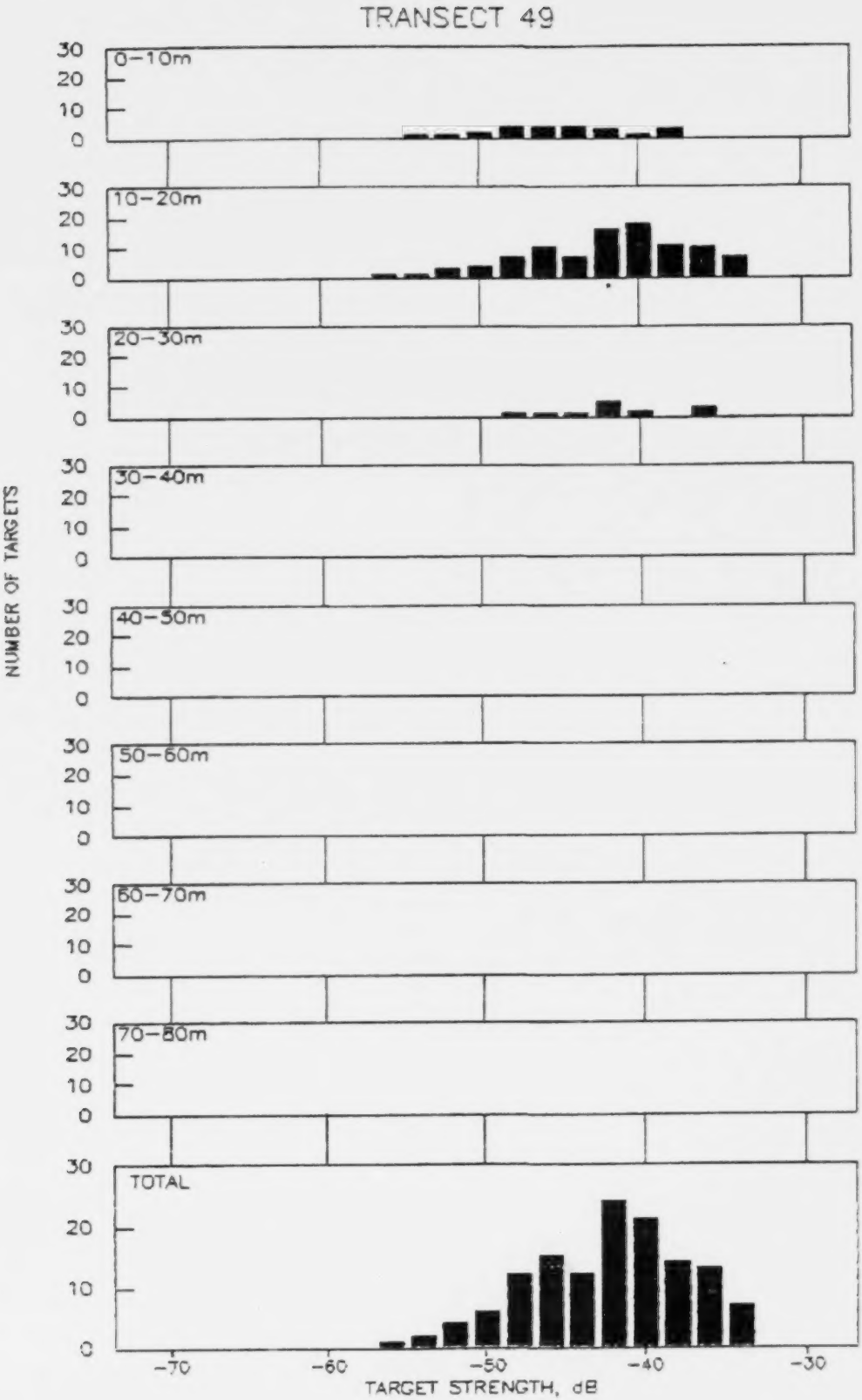

TRANSECT 40
0–10m
10–20m
20–30m
30–40m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

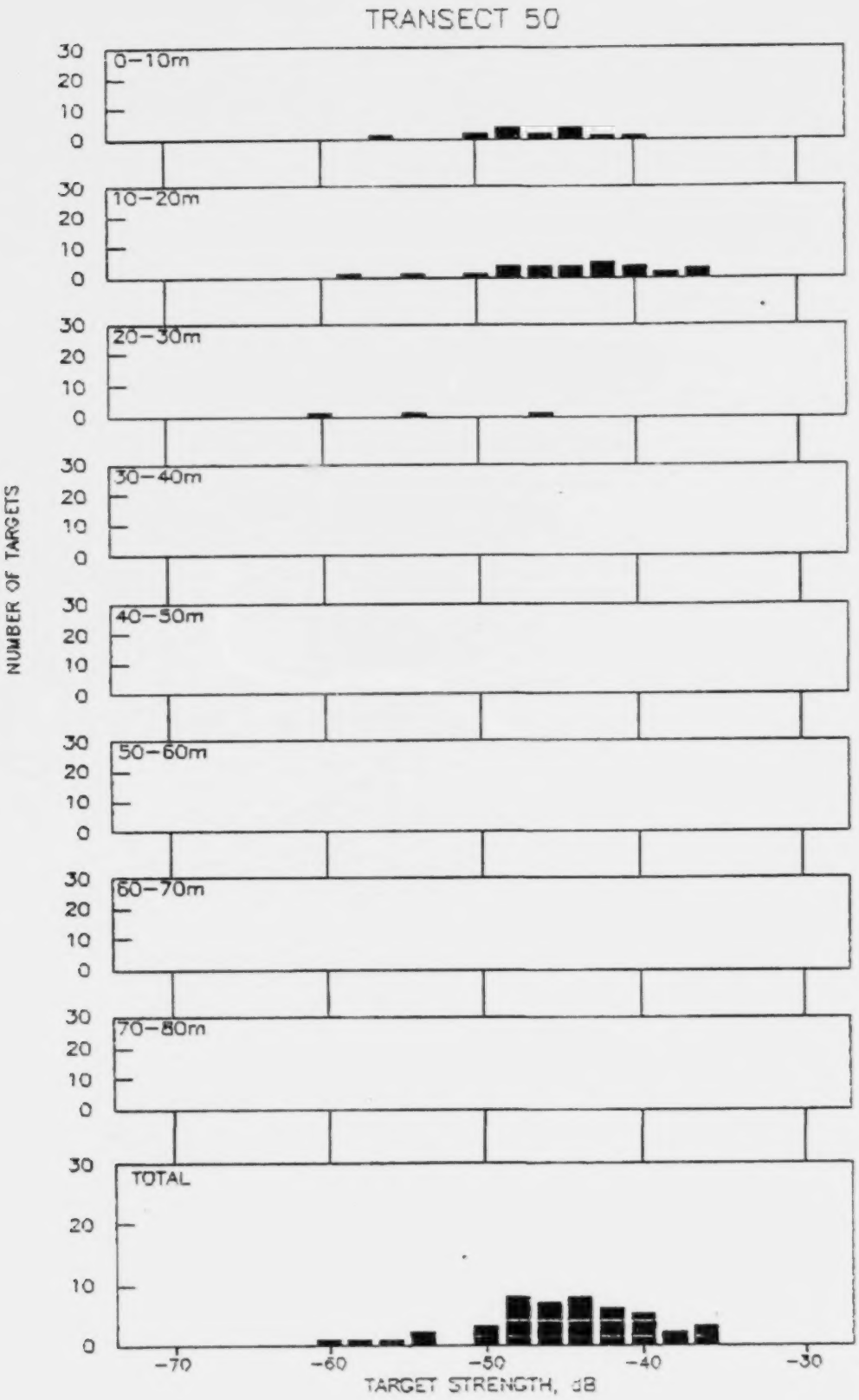

TRANSECT 43
NUMBER OF TARGETS
0–10m
10–20m
20–30m
TOTAL
30
20
10
0
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

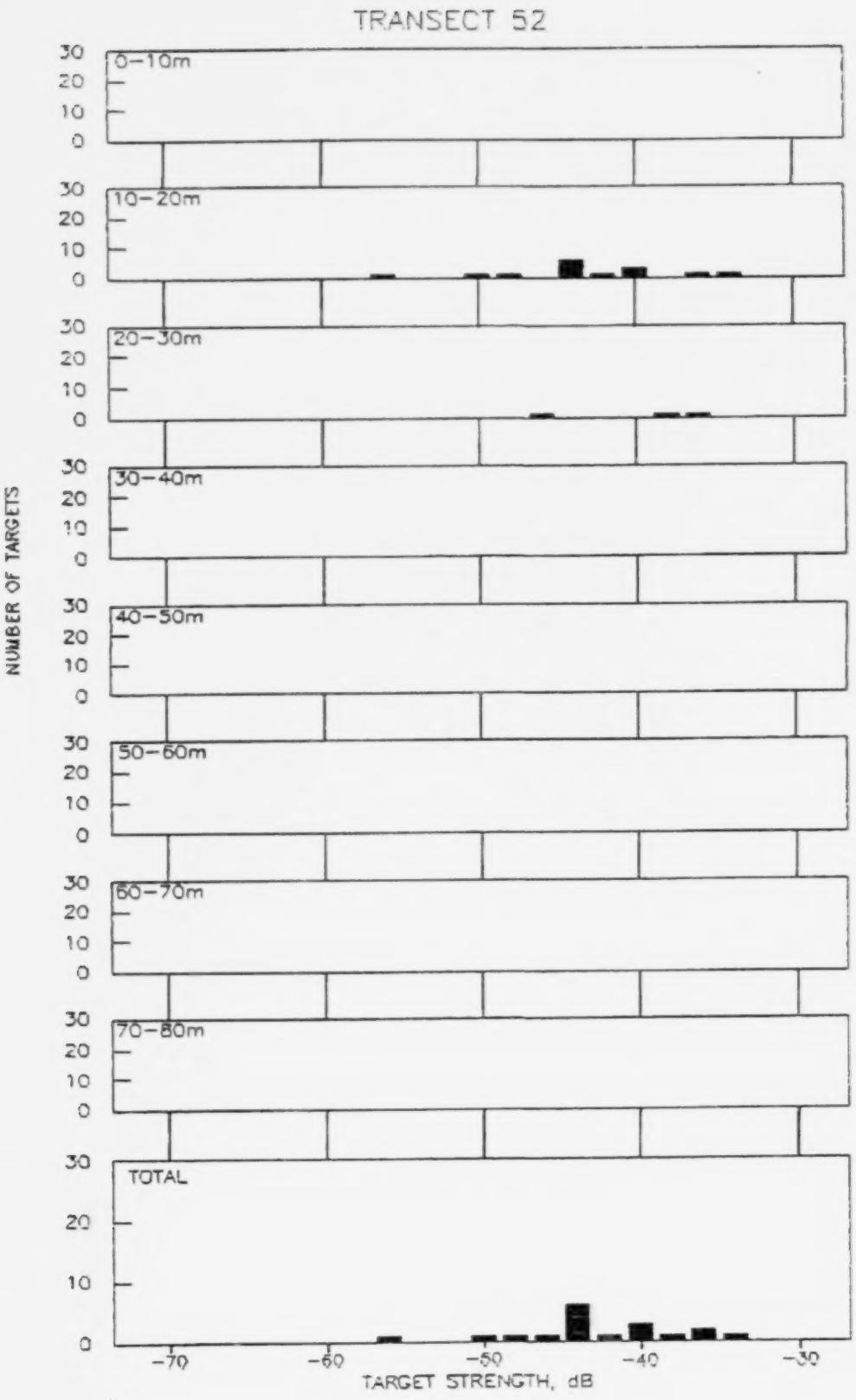

TRANSECT 44
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

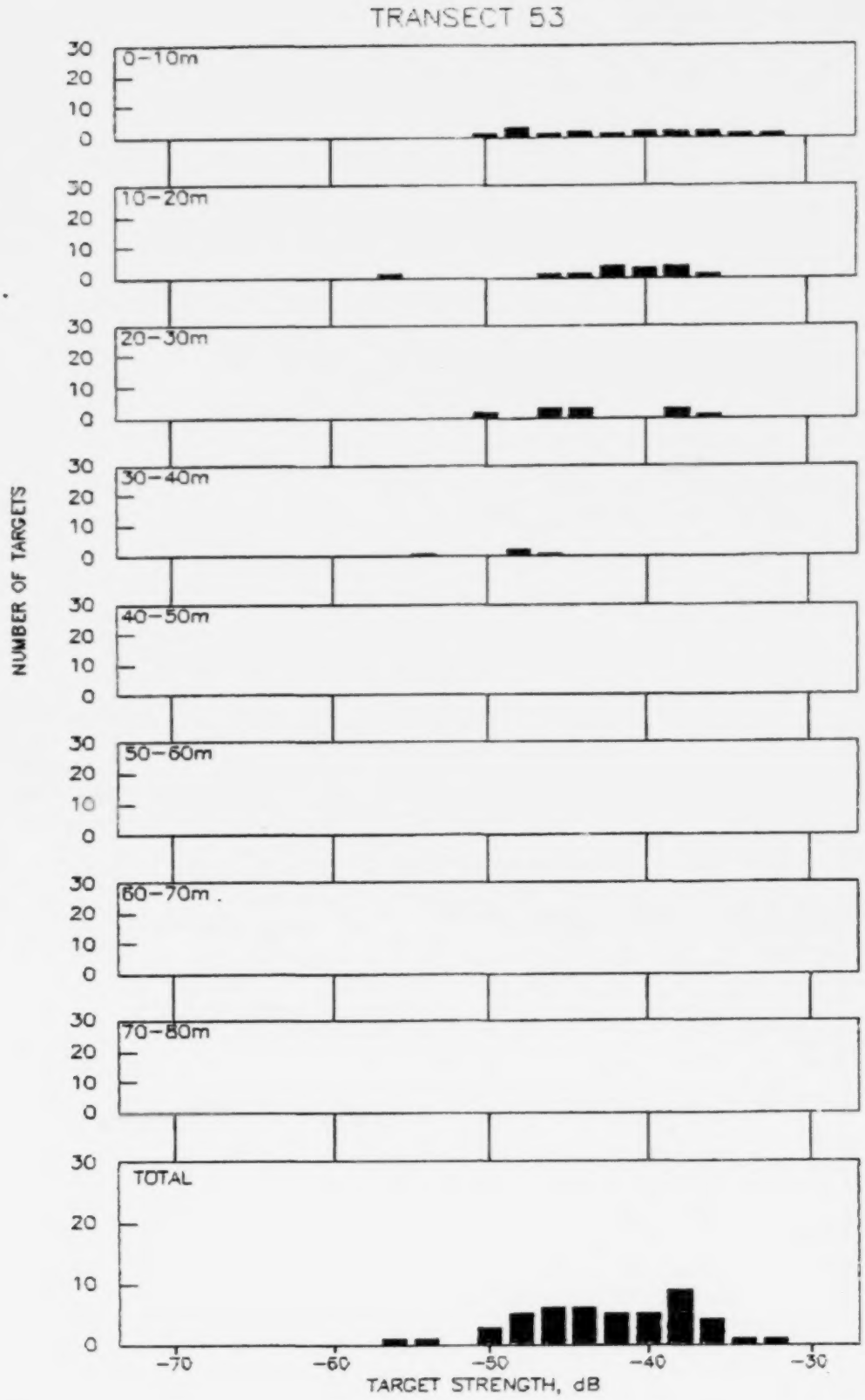

TRANSECT 47
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

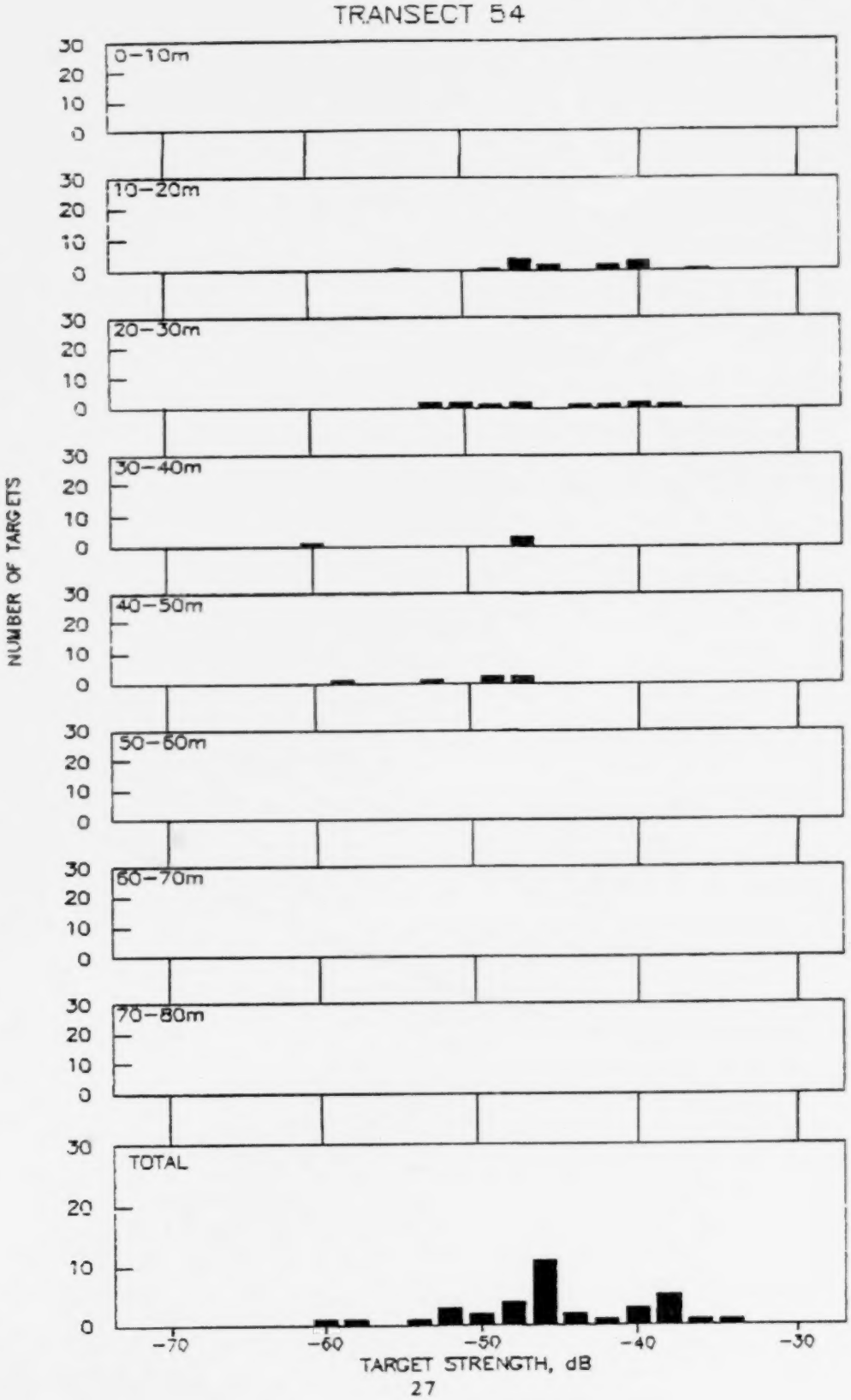

TRANSECT 48
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

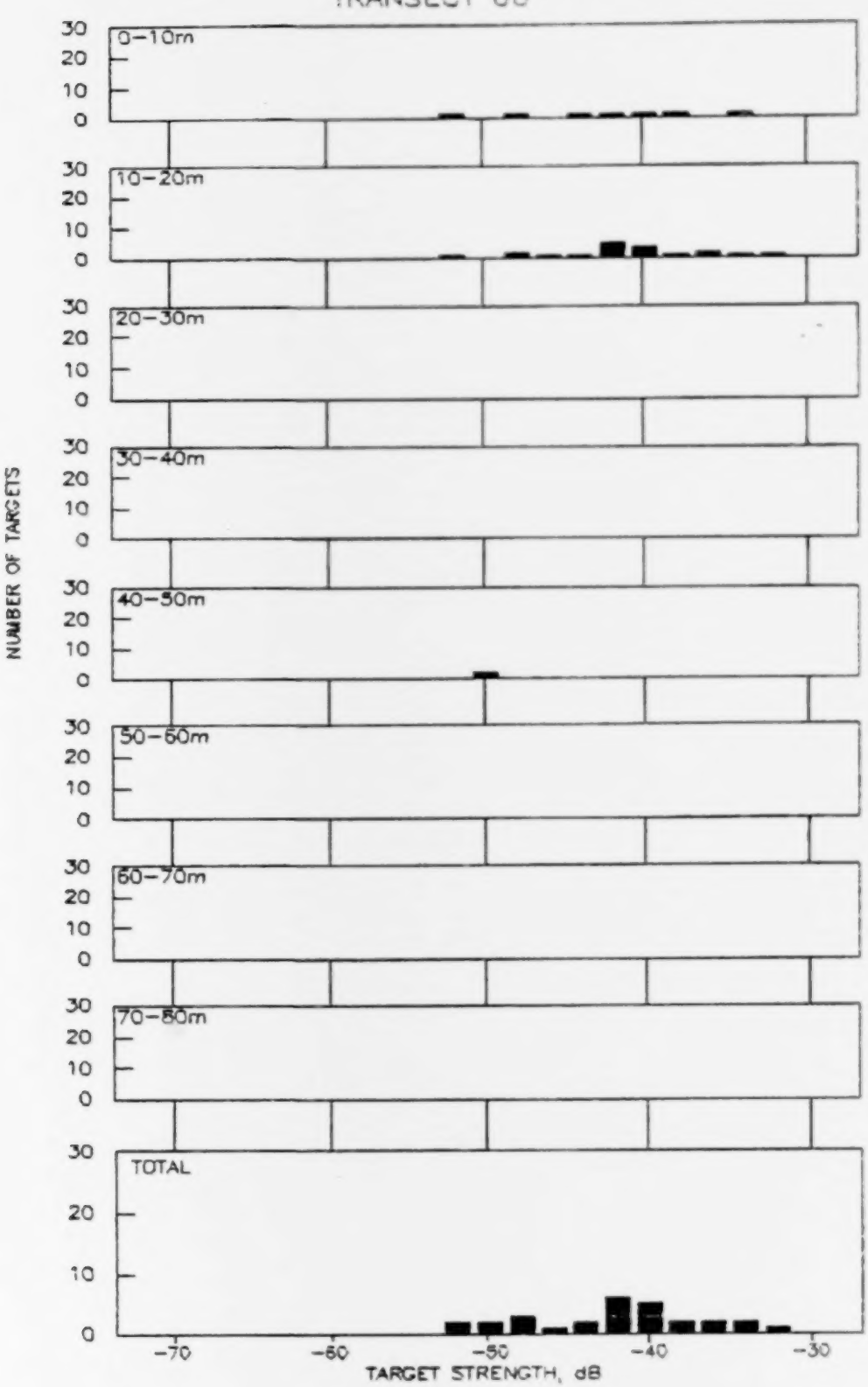

TRANSECT 49
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
–70
–60
–50
–40
–30
TARGET STRENGTH, dB

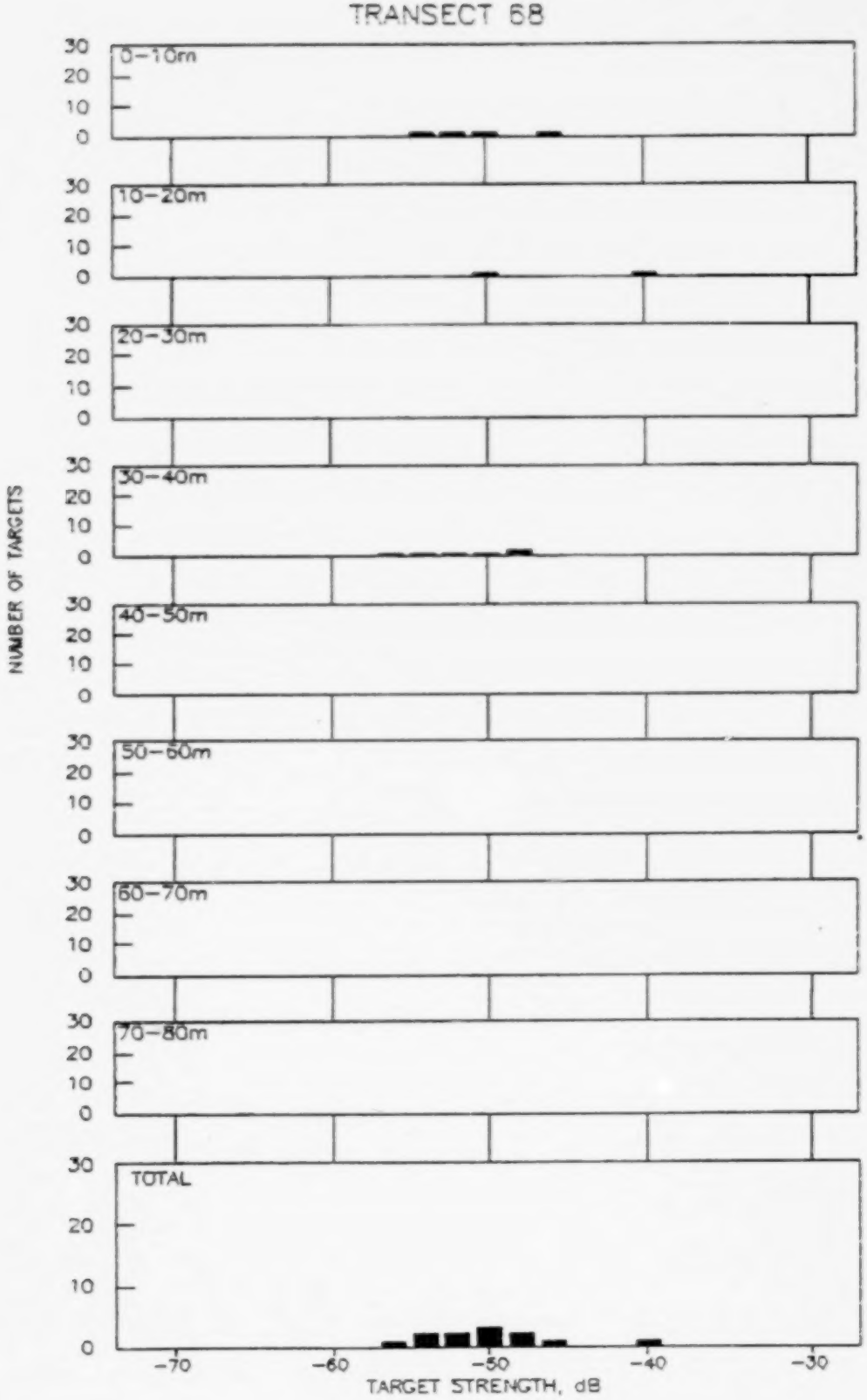

TRANSECT 50
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

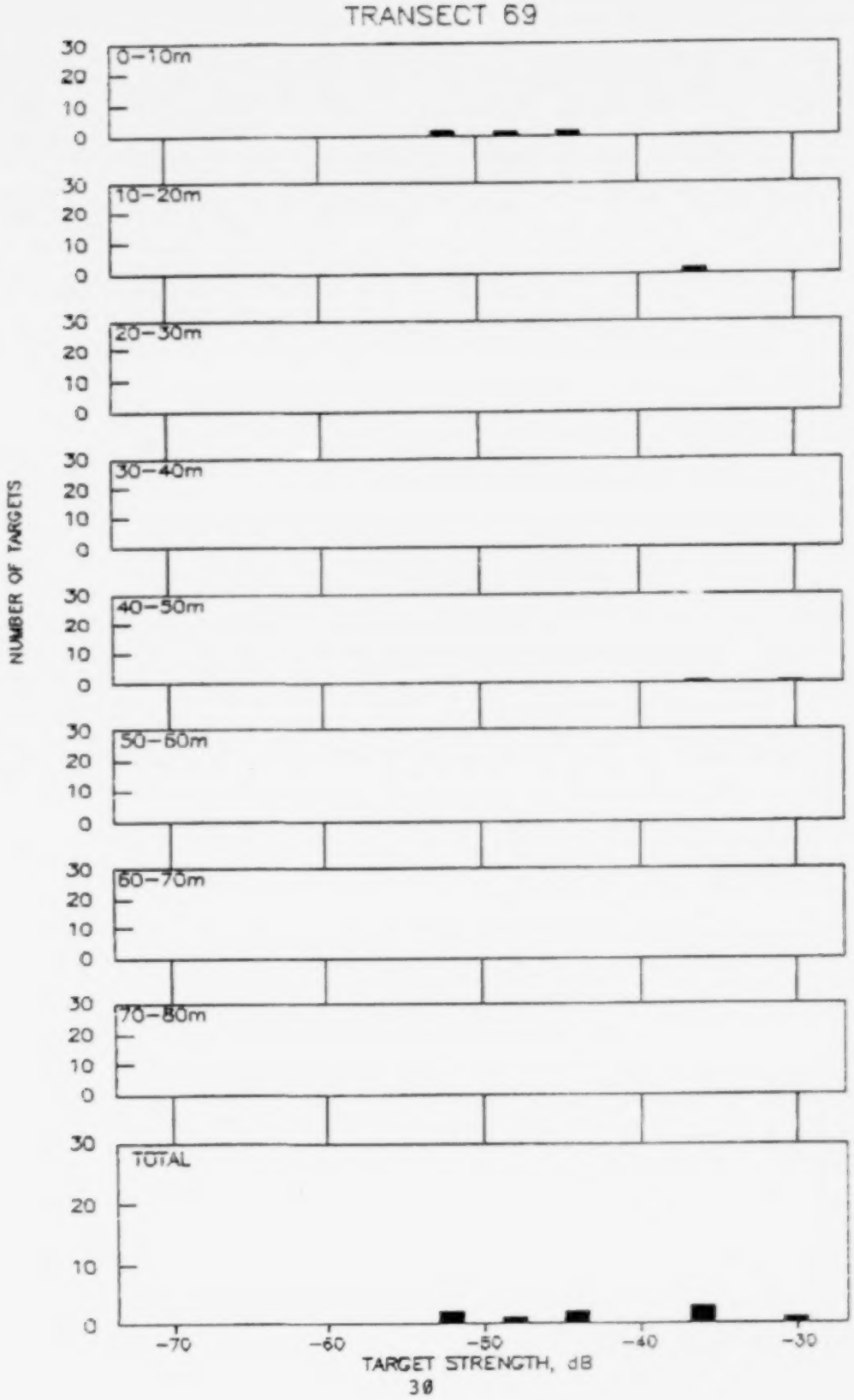

TRANSECT 52
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB


TRANSECT 53
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB


TRANSECT 54
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB


TRANSECT 66
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB


TRANSECT 68
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB


TRANSECT 69
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

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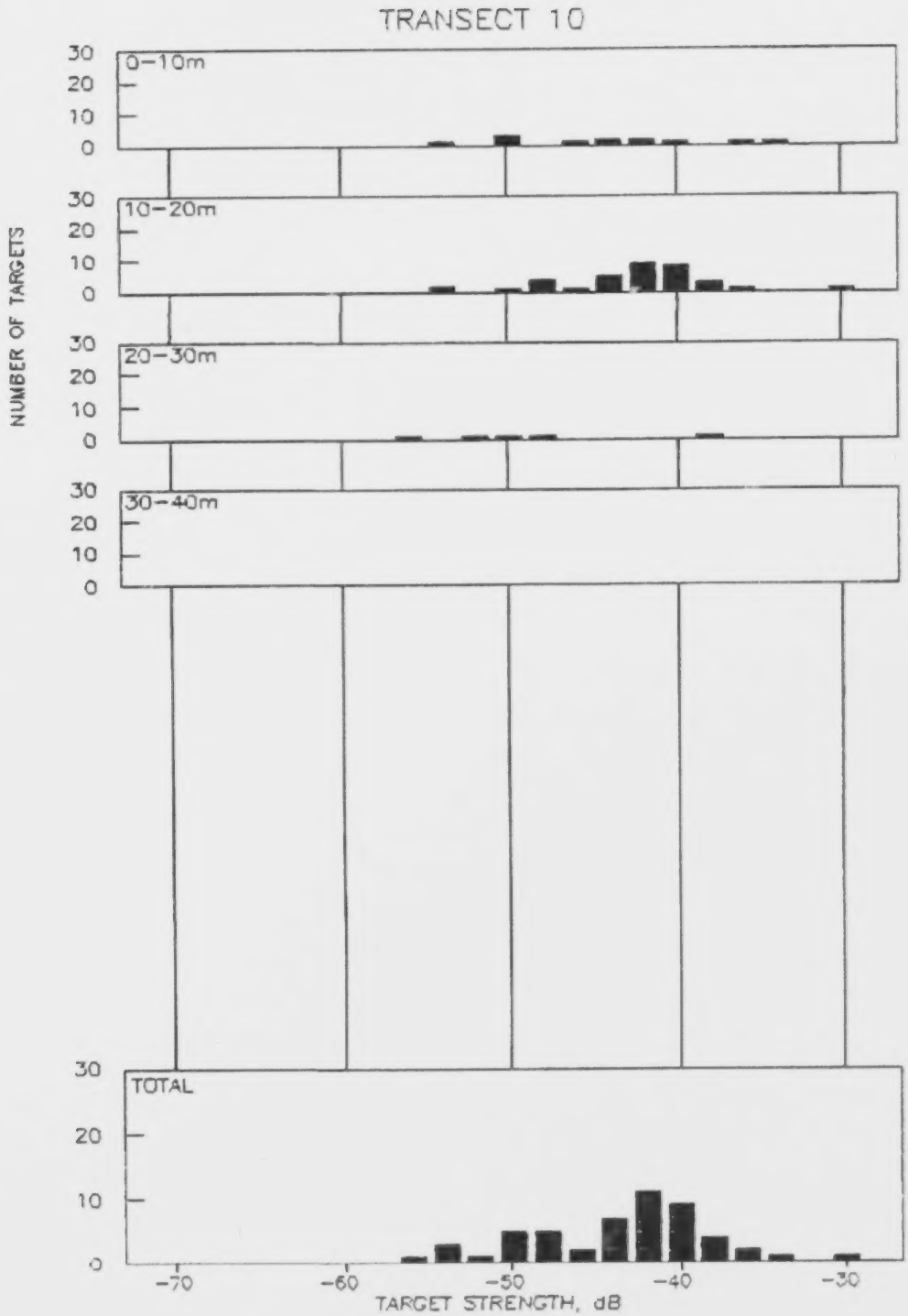
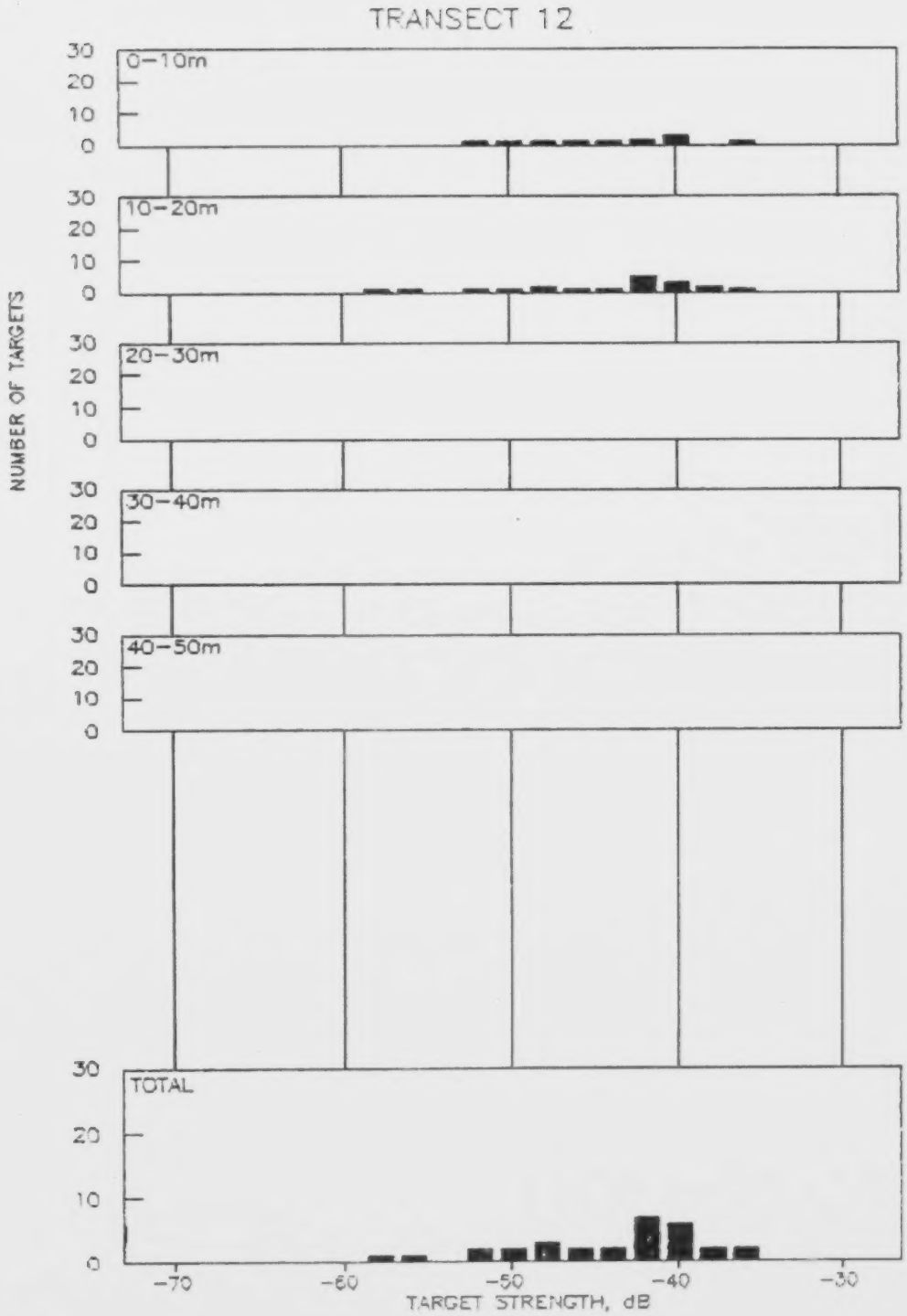
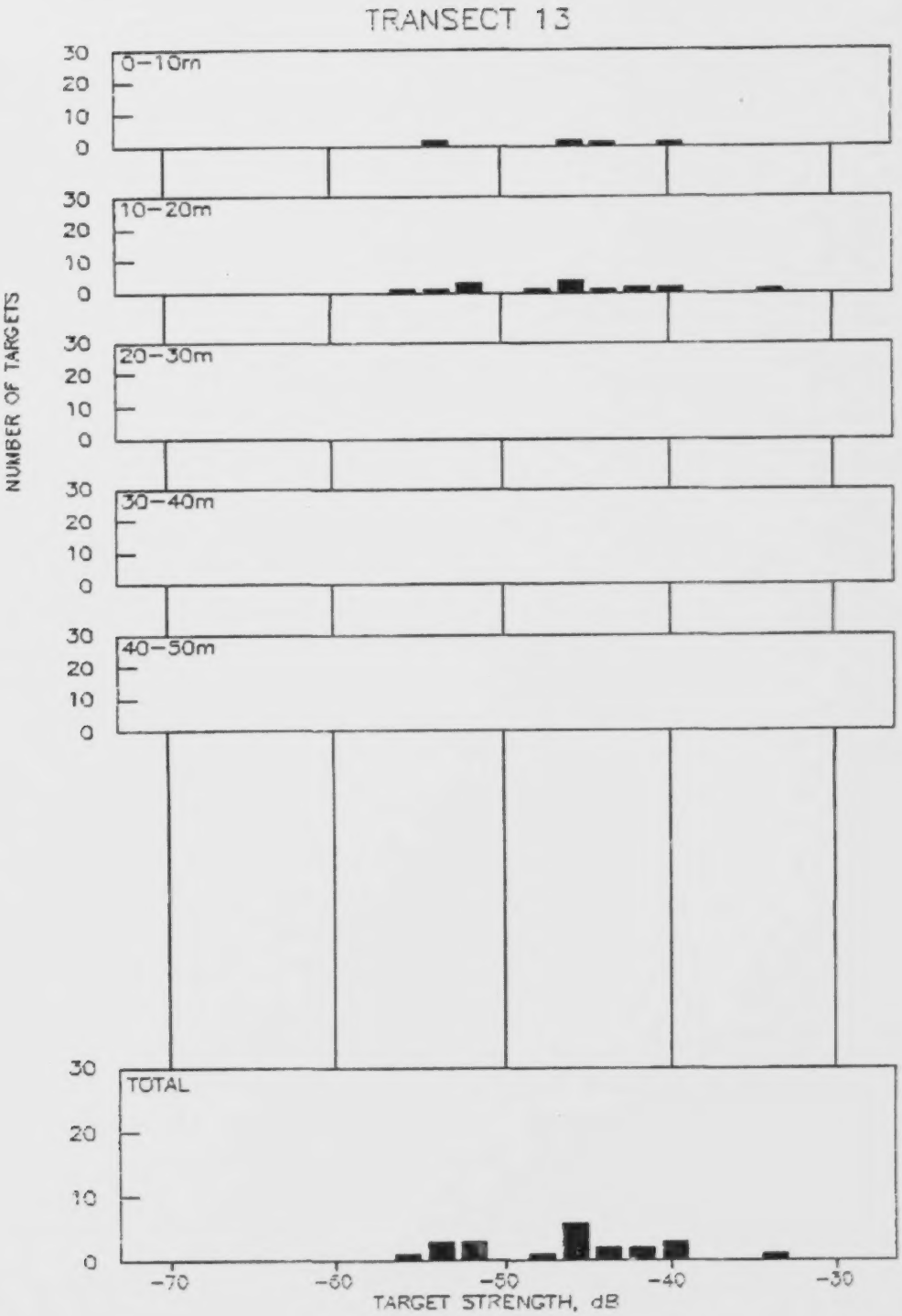
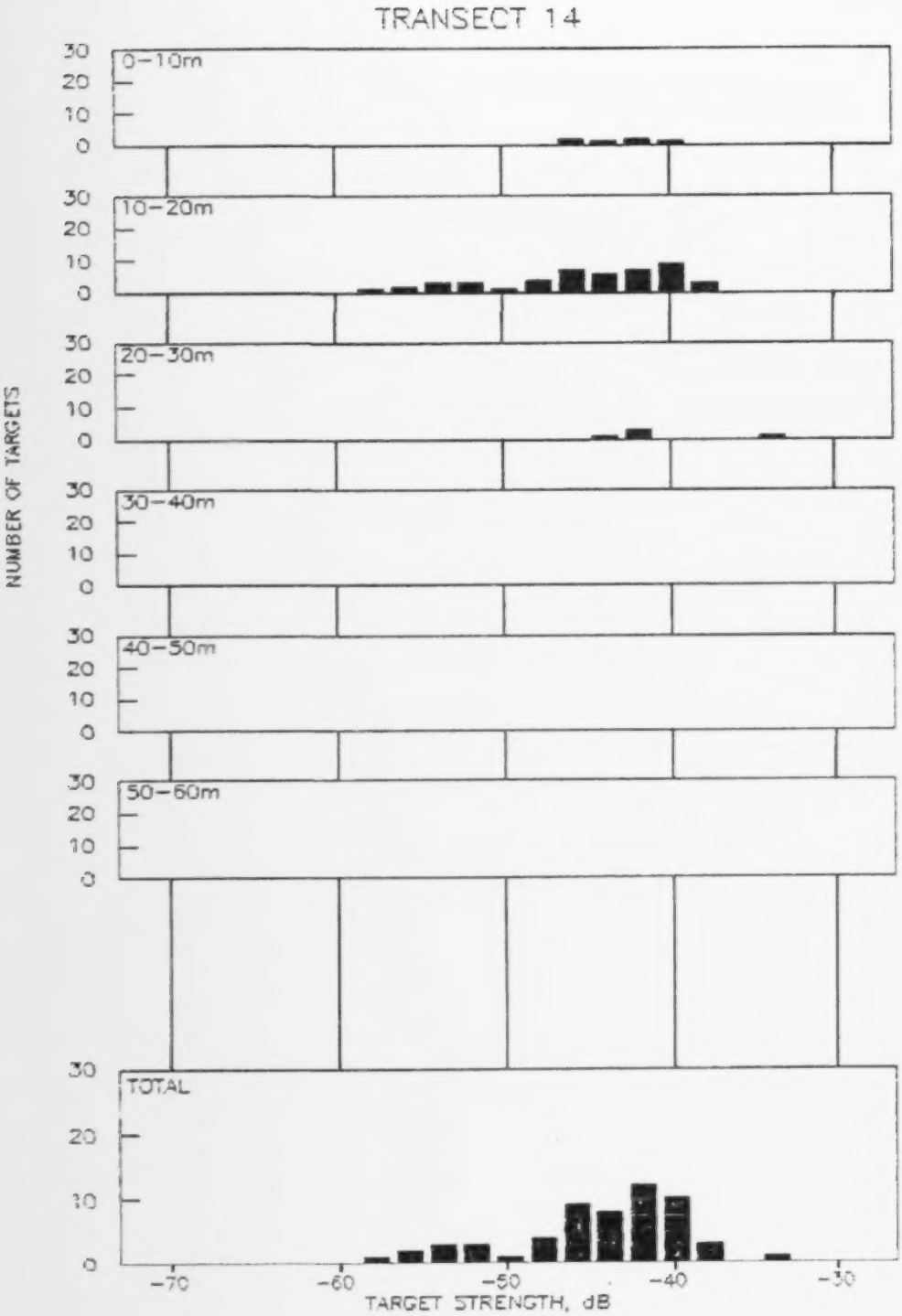
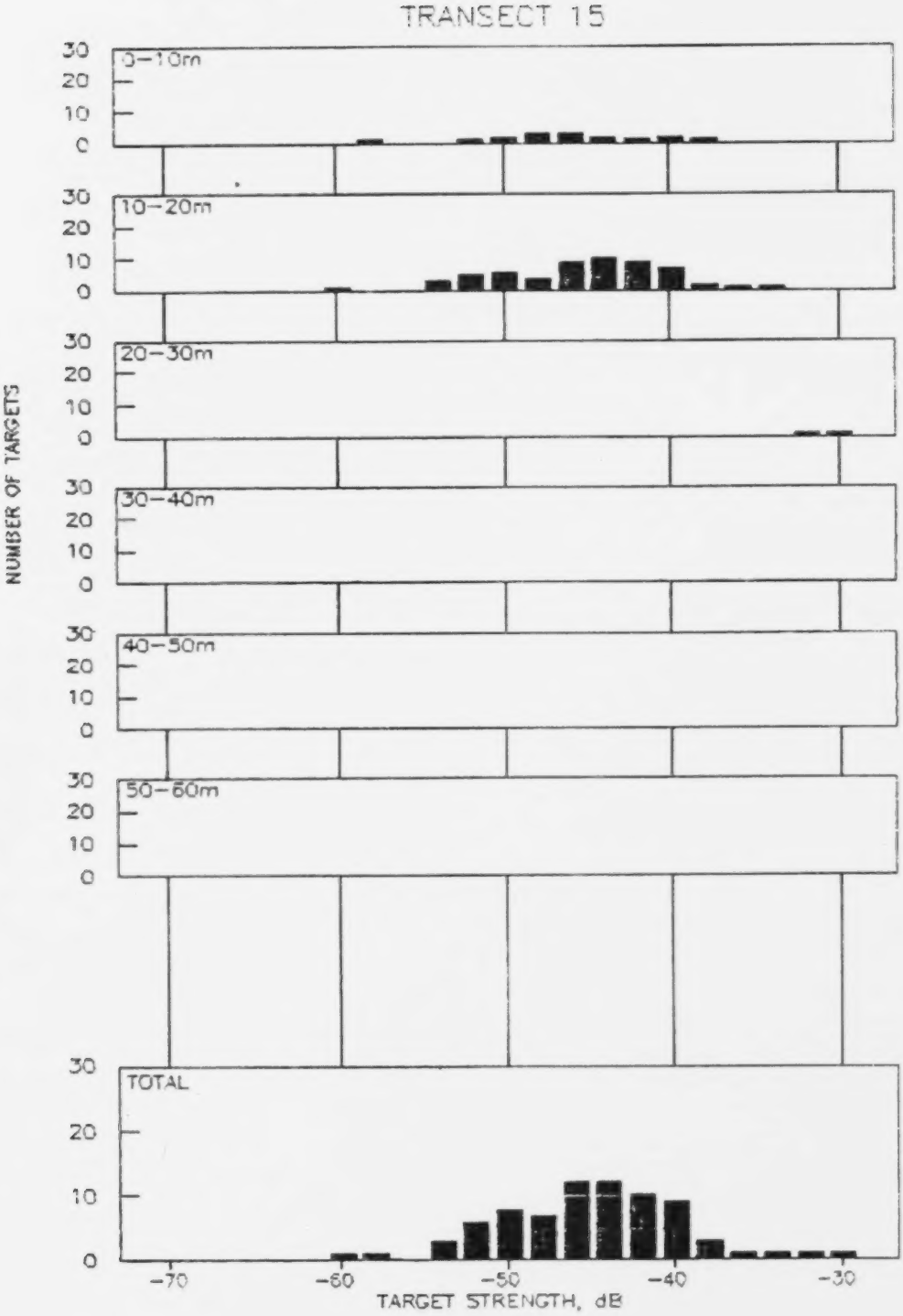
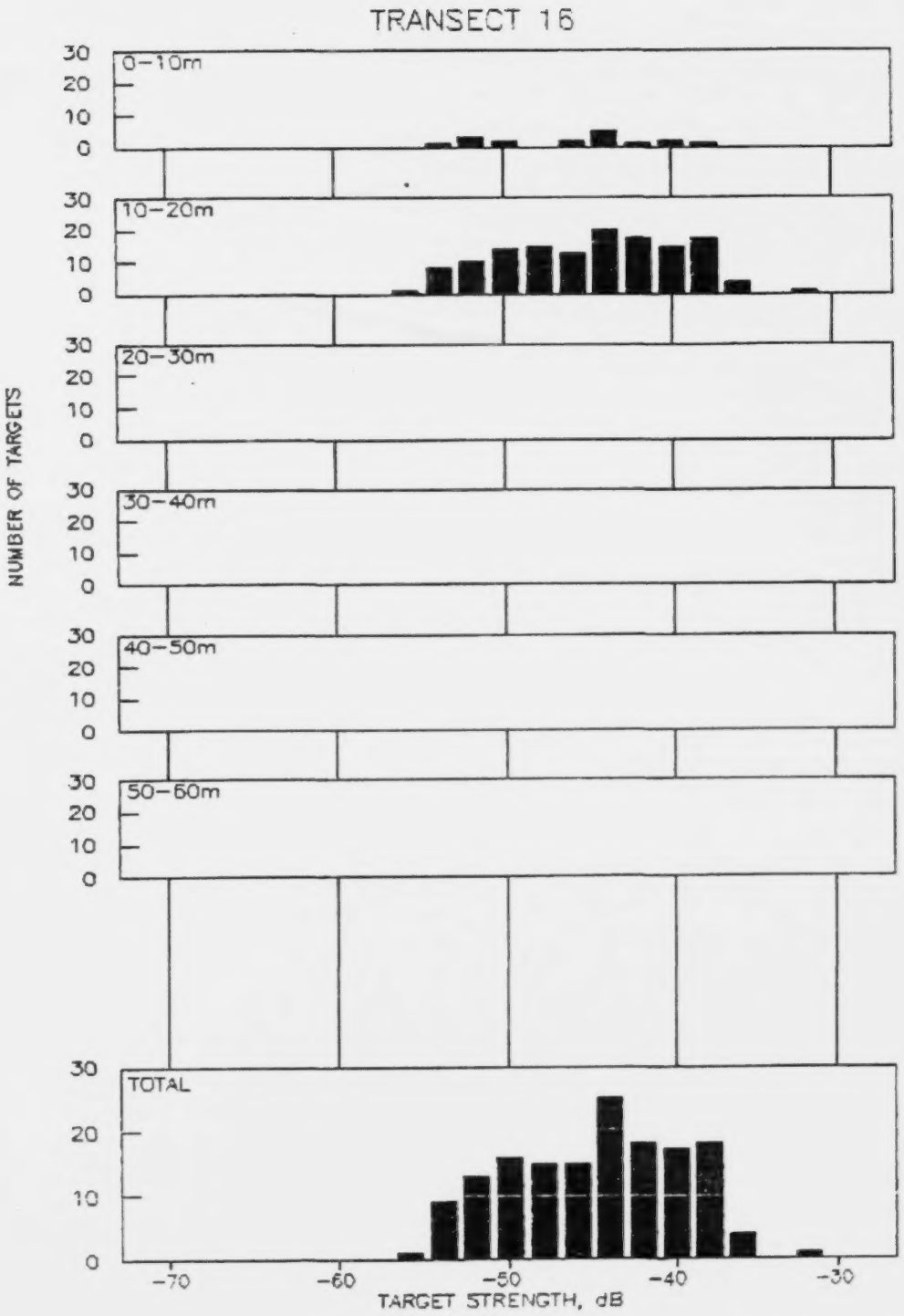

TRANSECT 10
0-10m
10-20m
20-30m
30-40m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

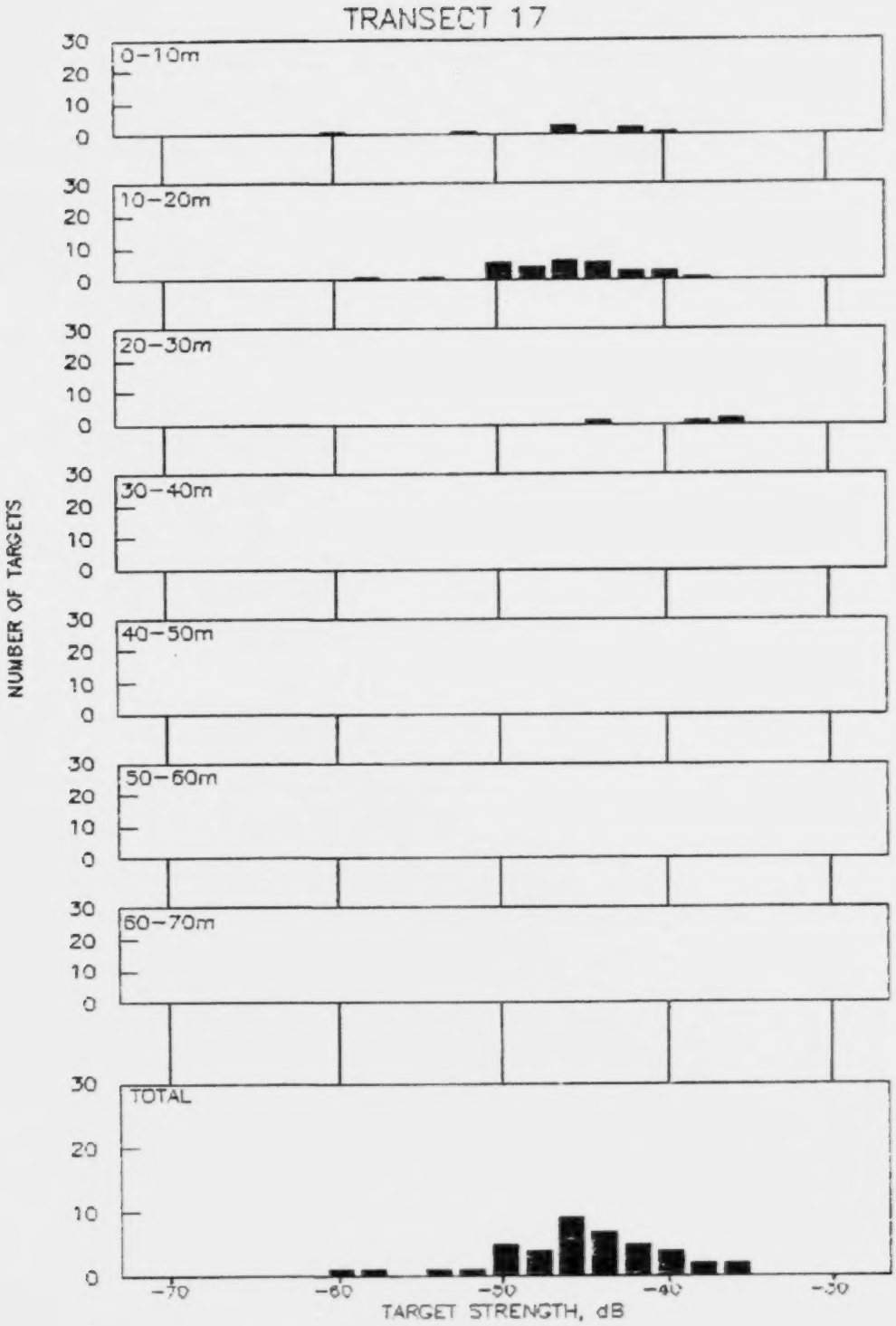

TRANSECT 12
NUMBER OF TARGETS
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

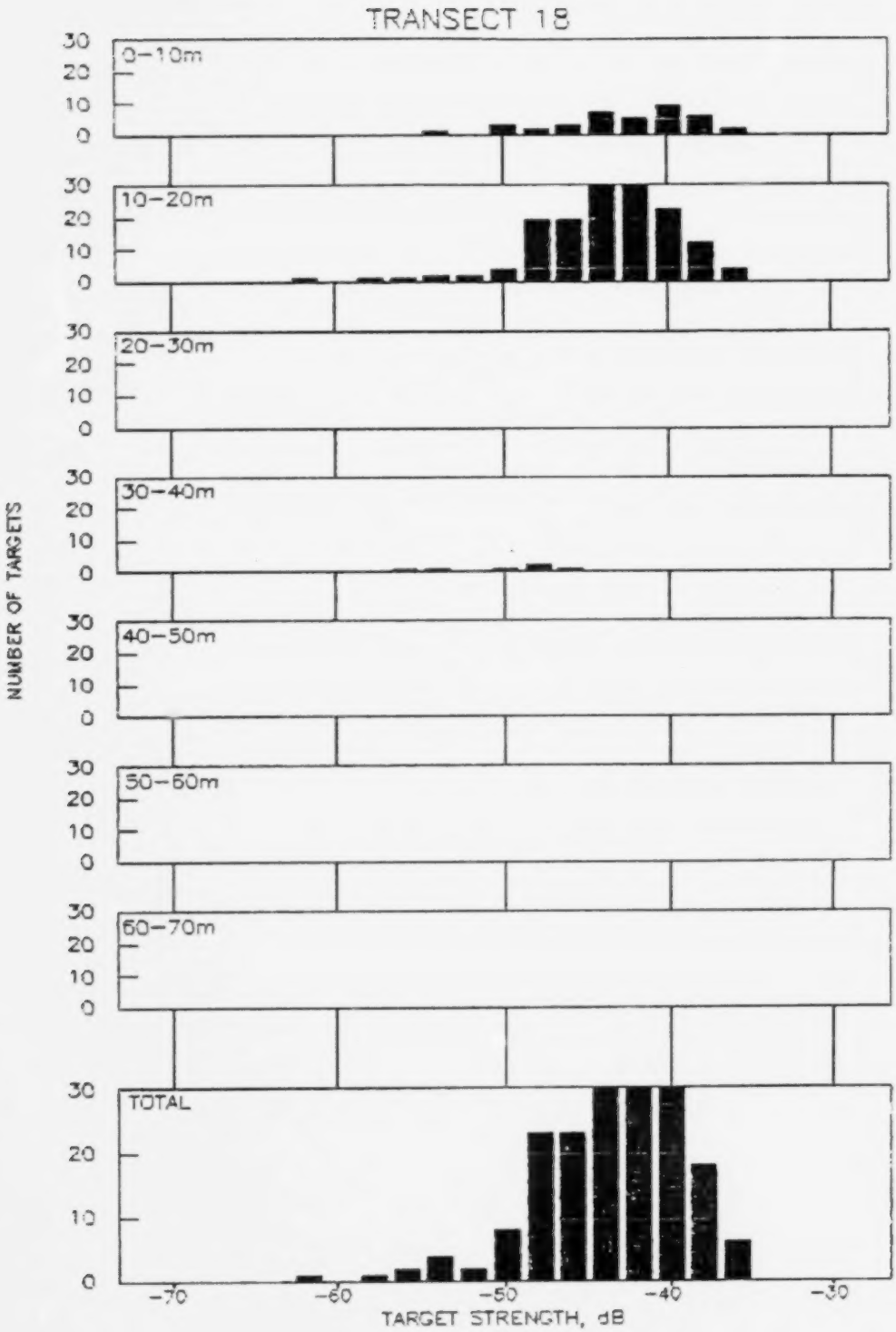

TRANSECT 13
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

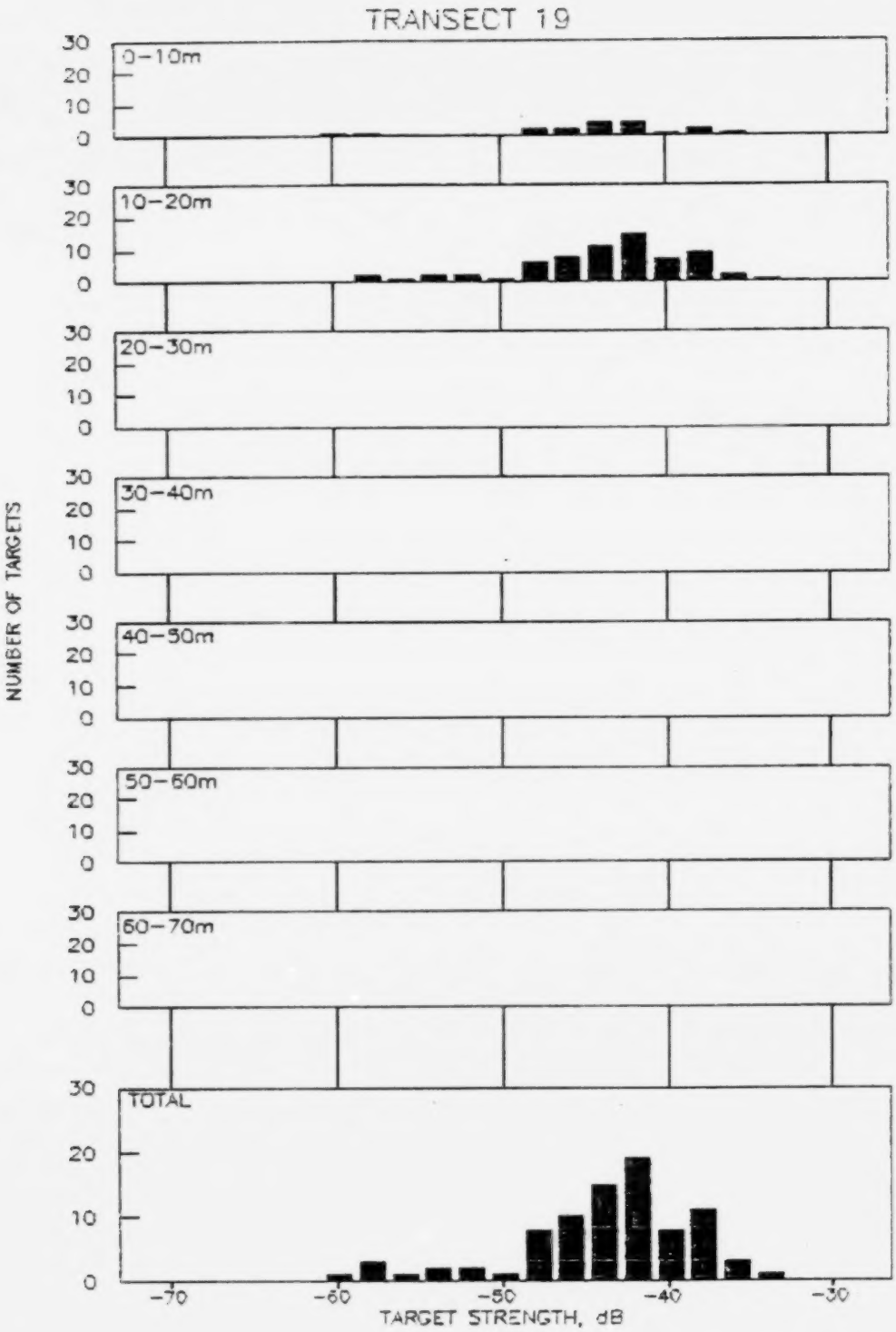

TRANSECT 14
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

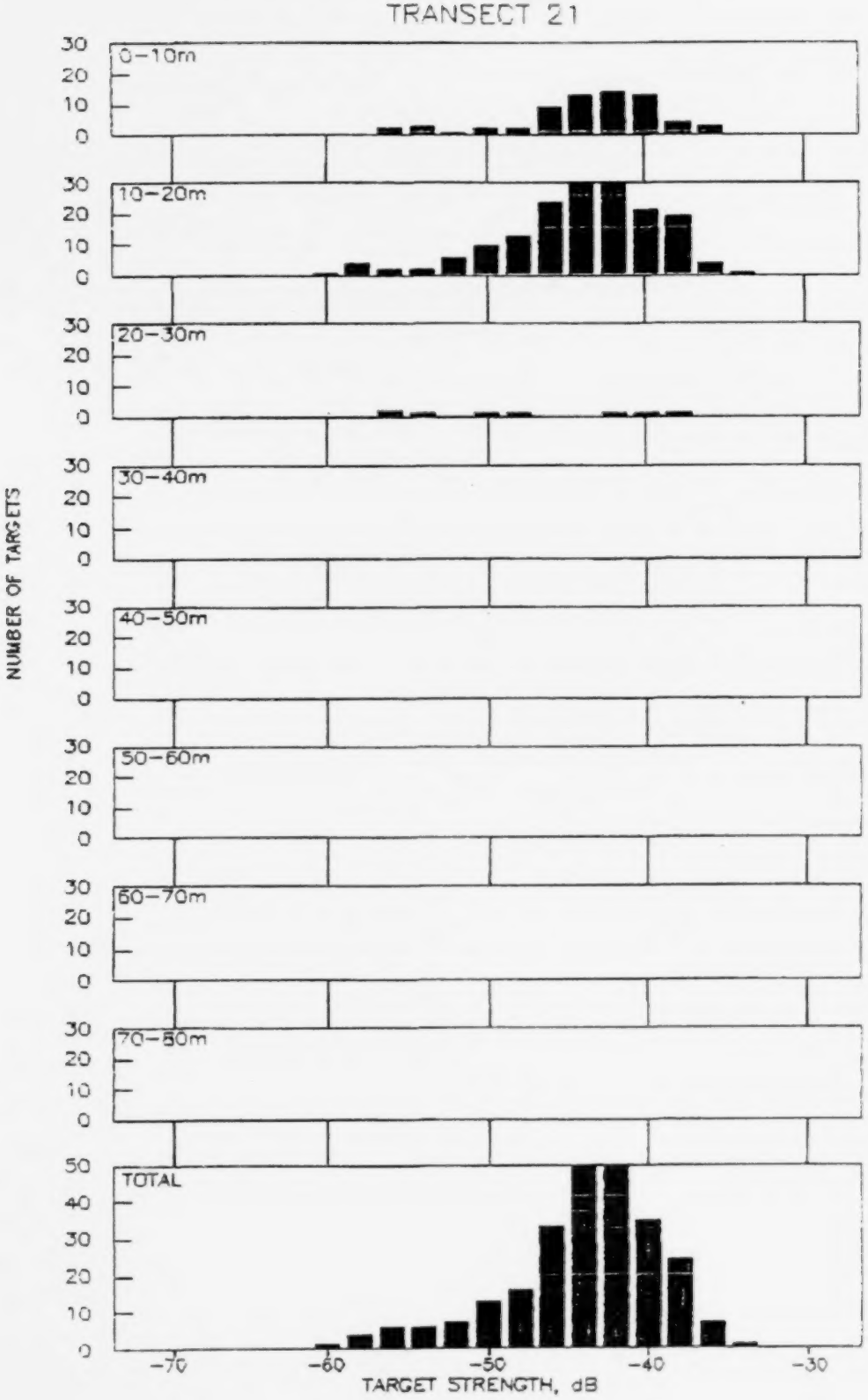

TRANSECT 15
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

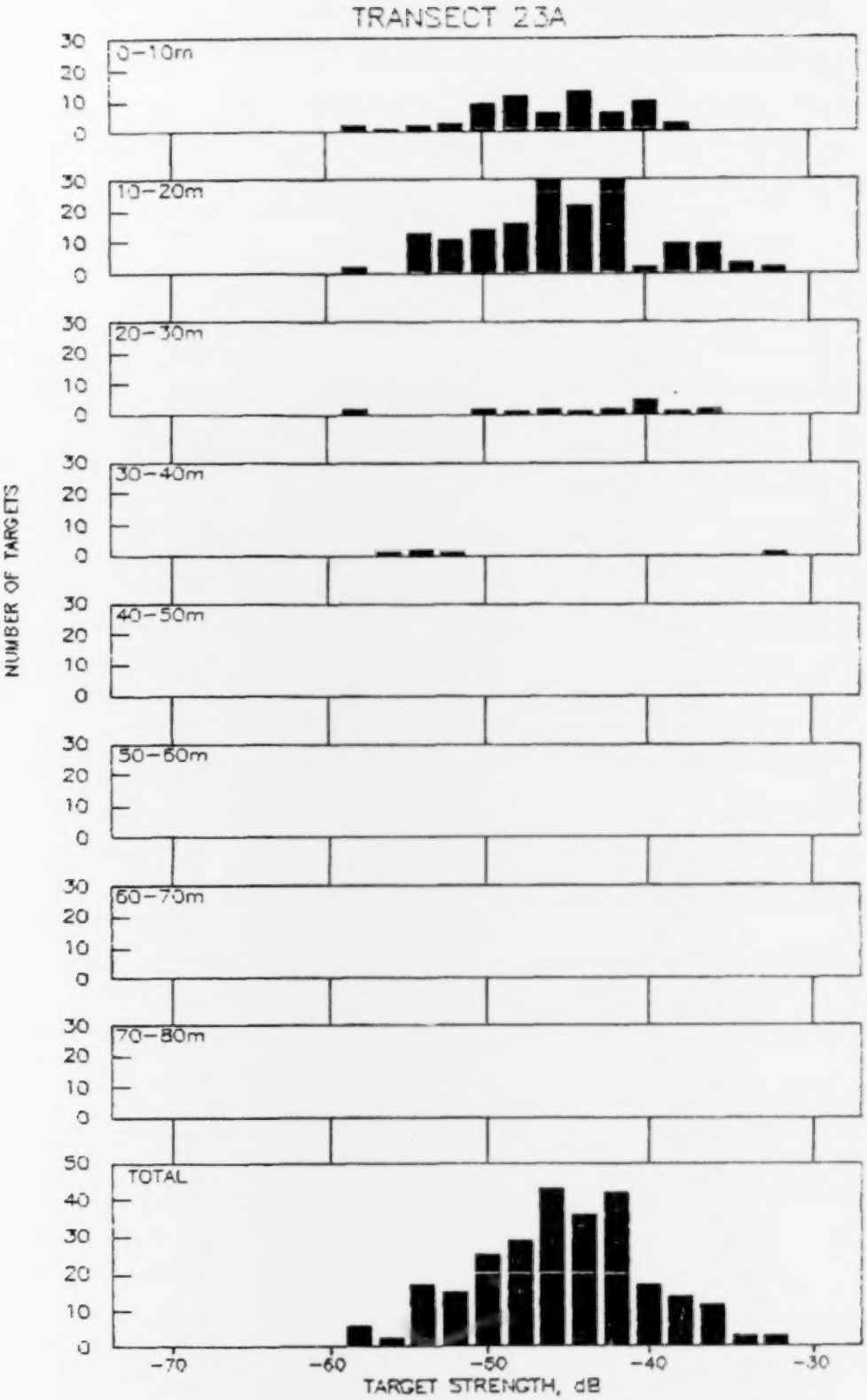

TRANSECT 16
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

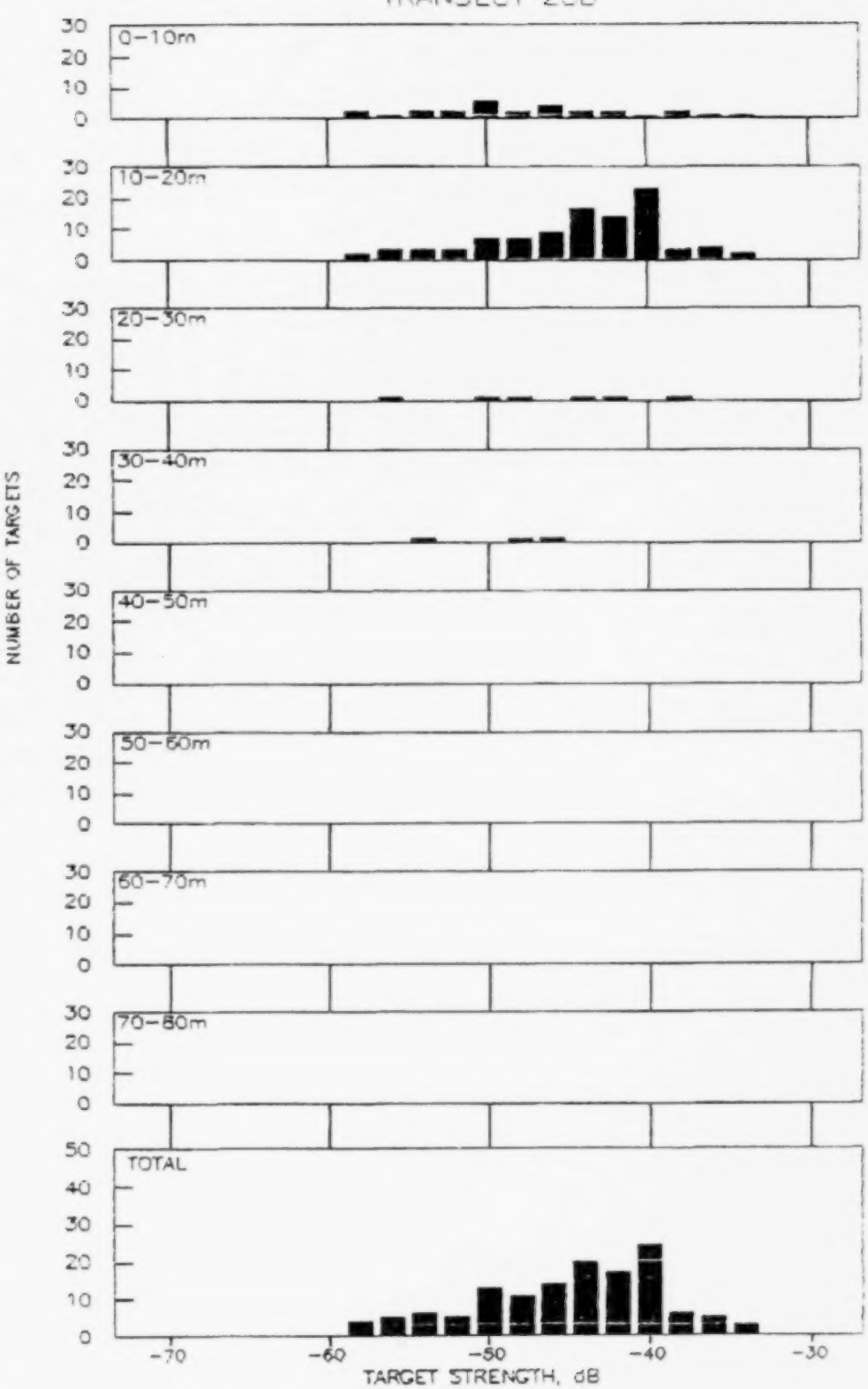

TRANSECT 17
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

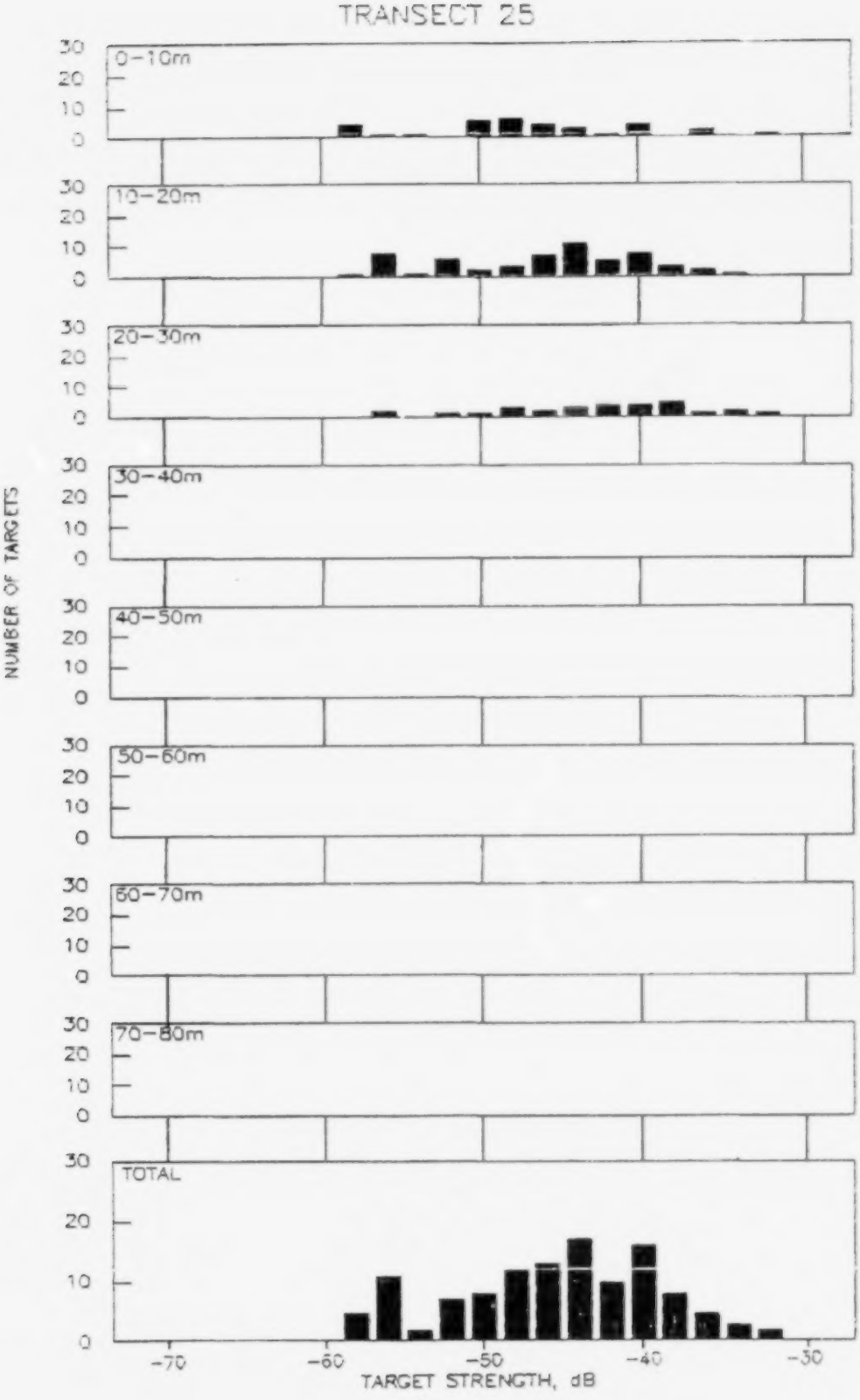

TRANSECT 18
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

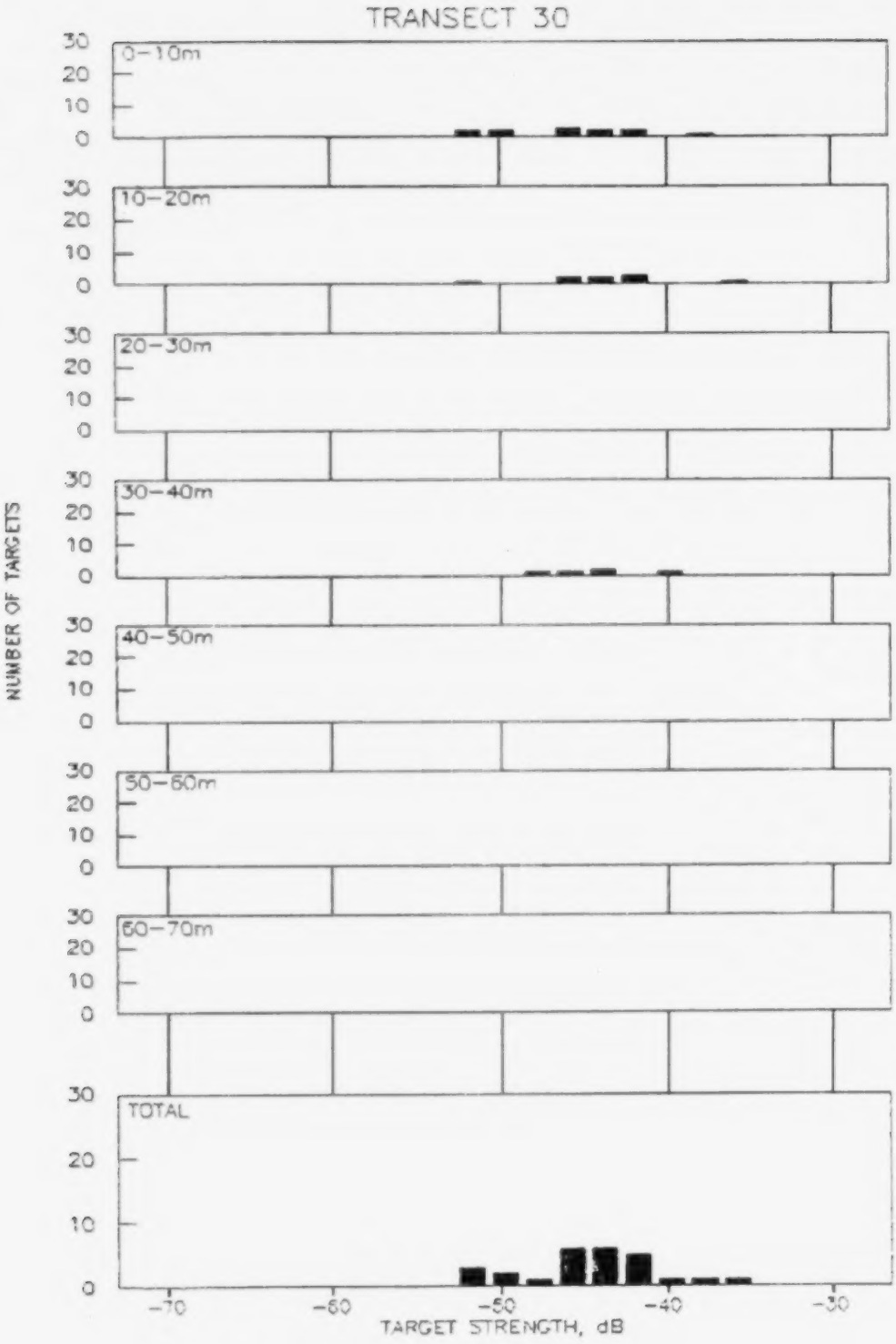

TRANSECT 19
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

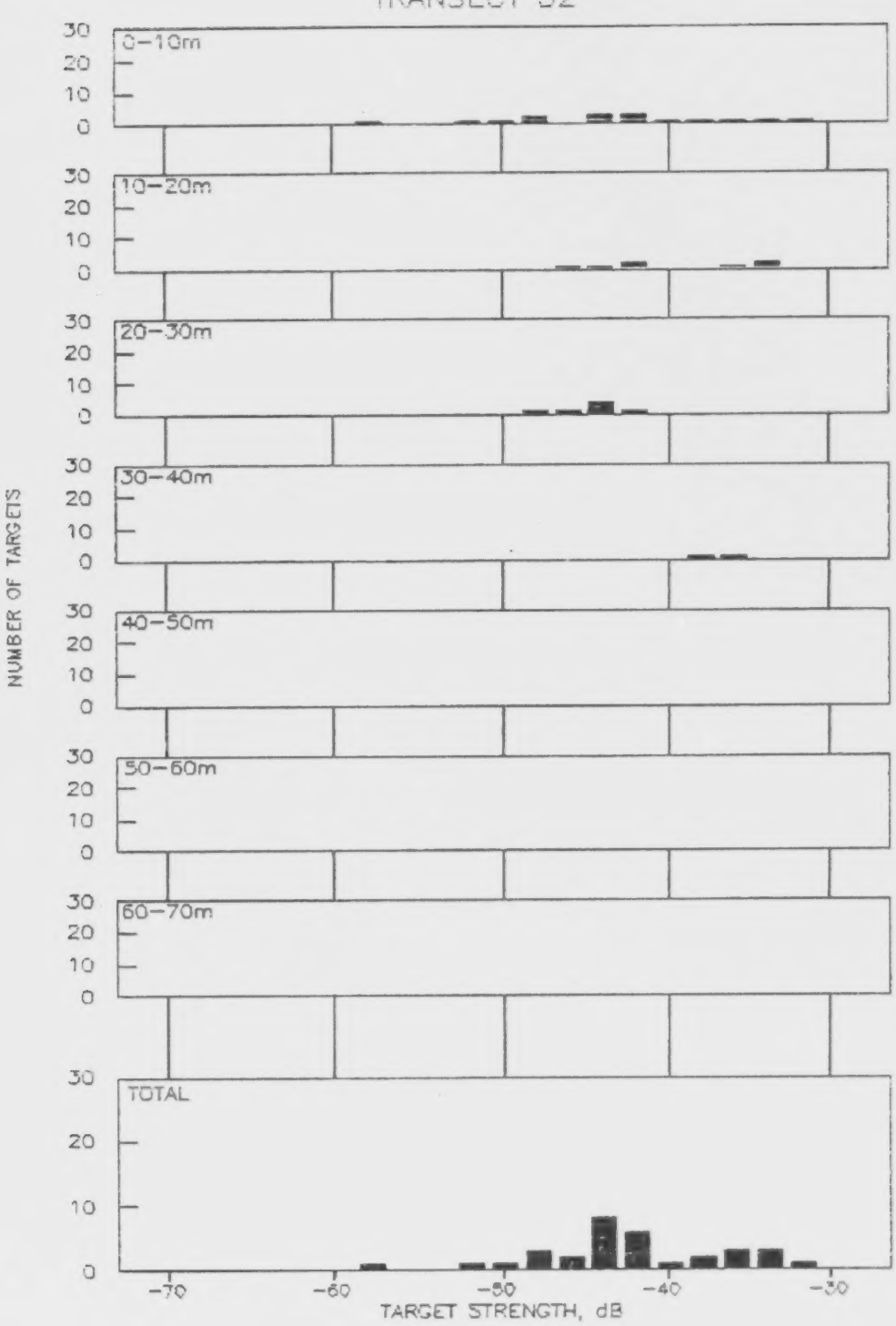

TRANSECT 21
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

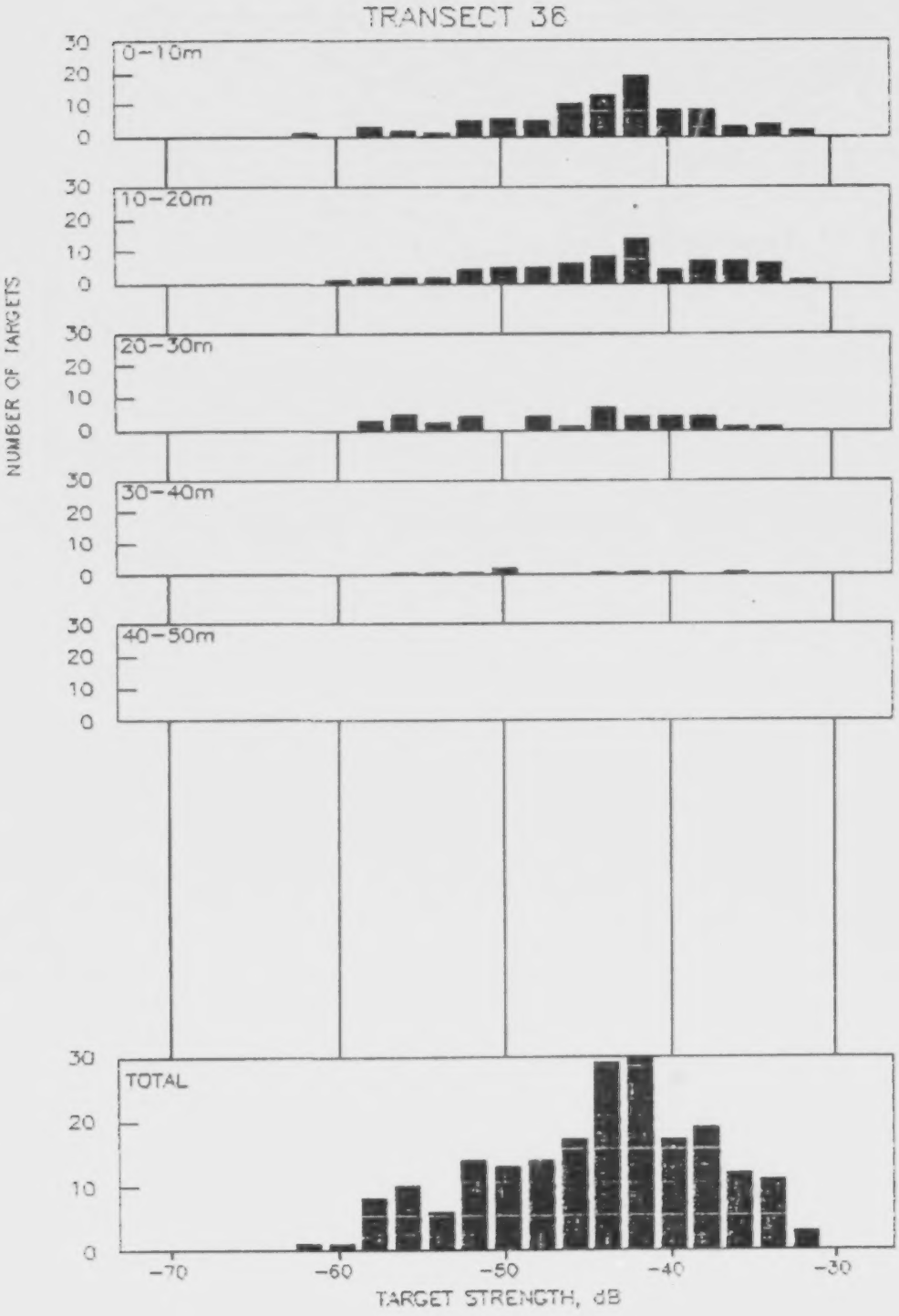

TRANSECT 23A
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

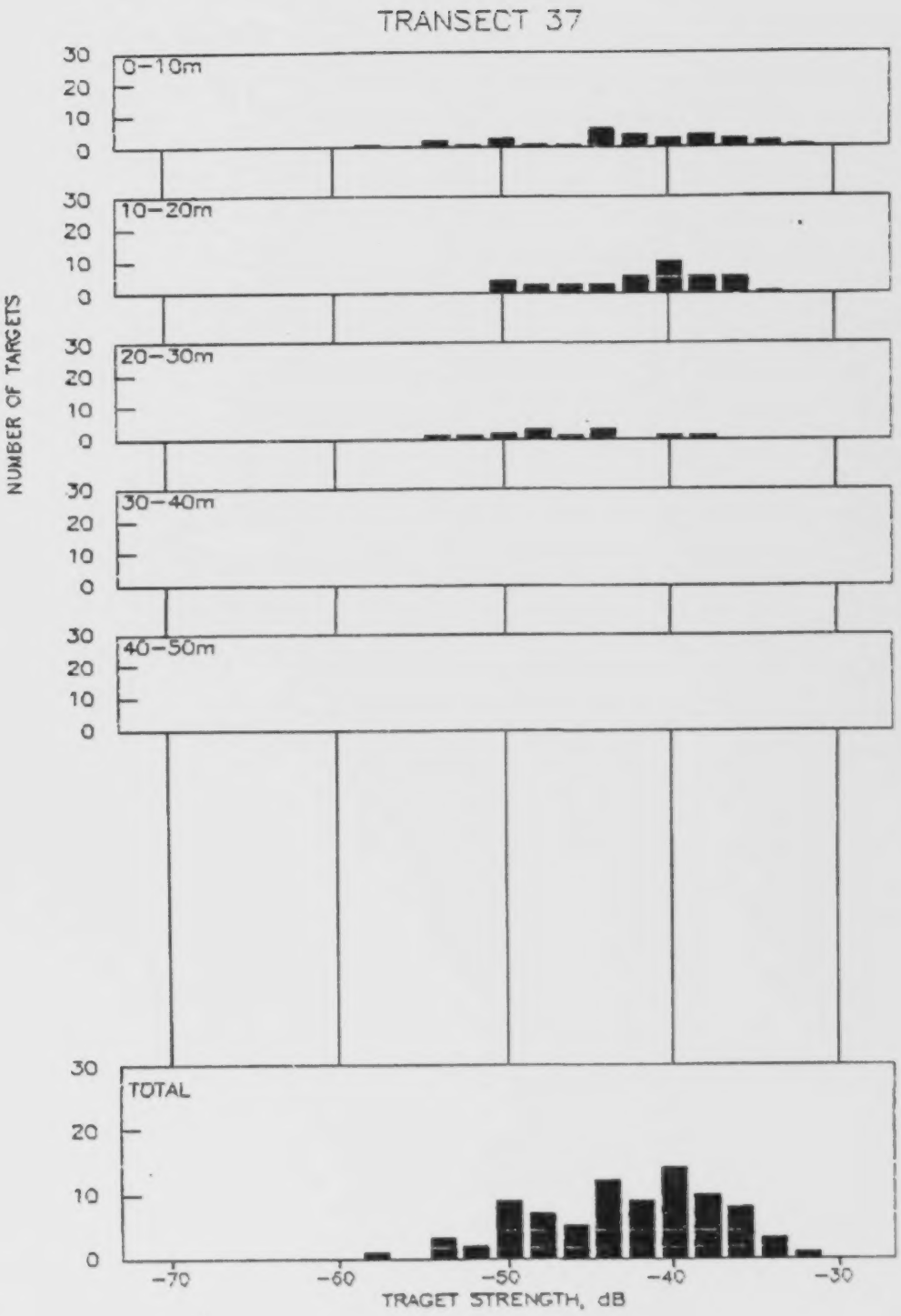

TRANSECT 23B
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

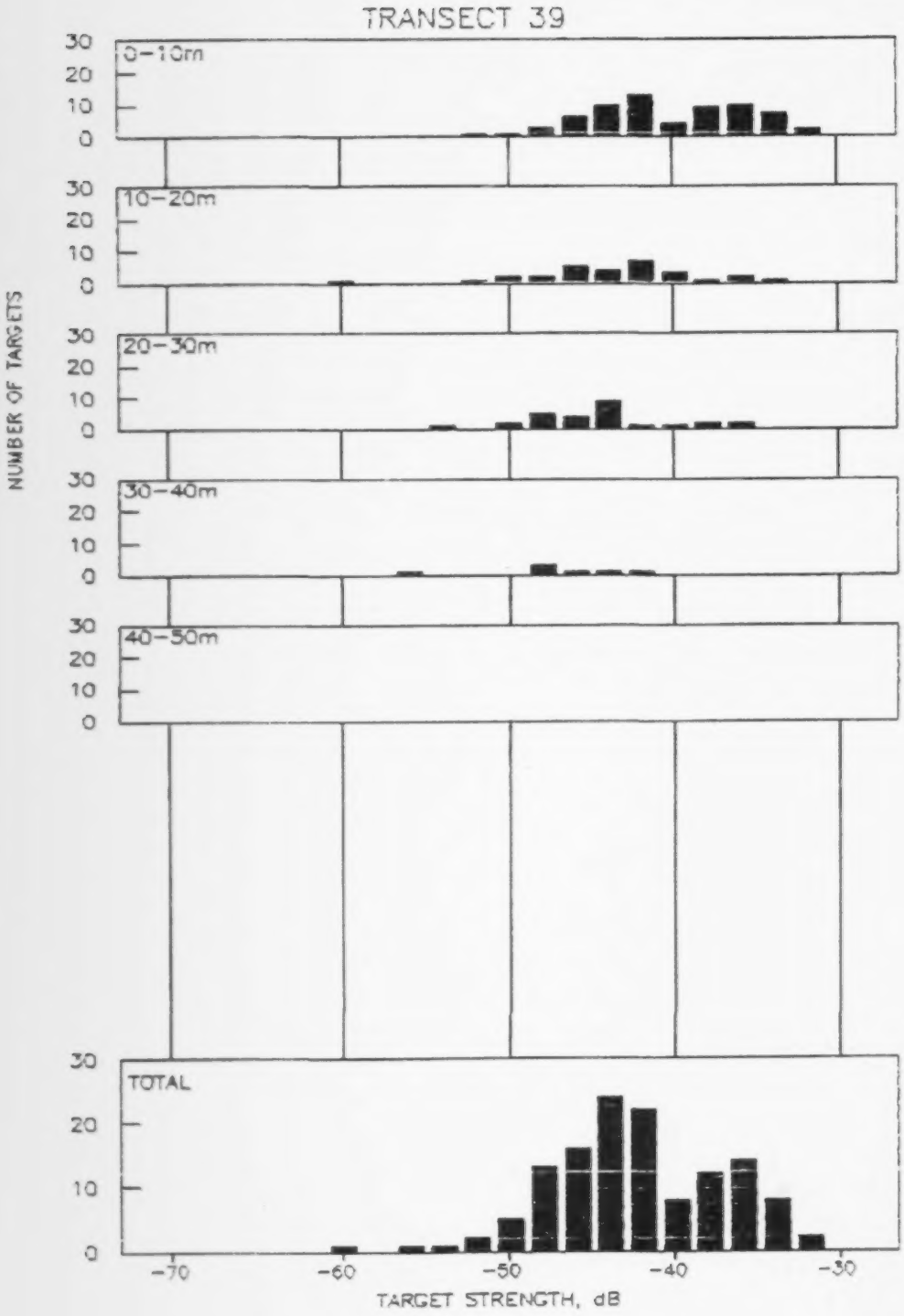

TRANSECT 25
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

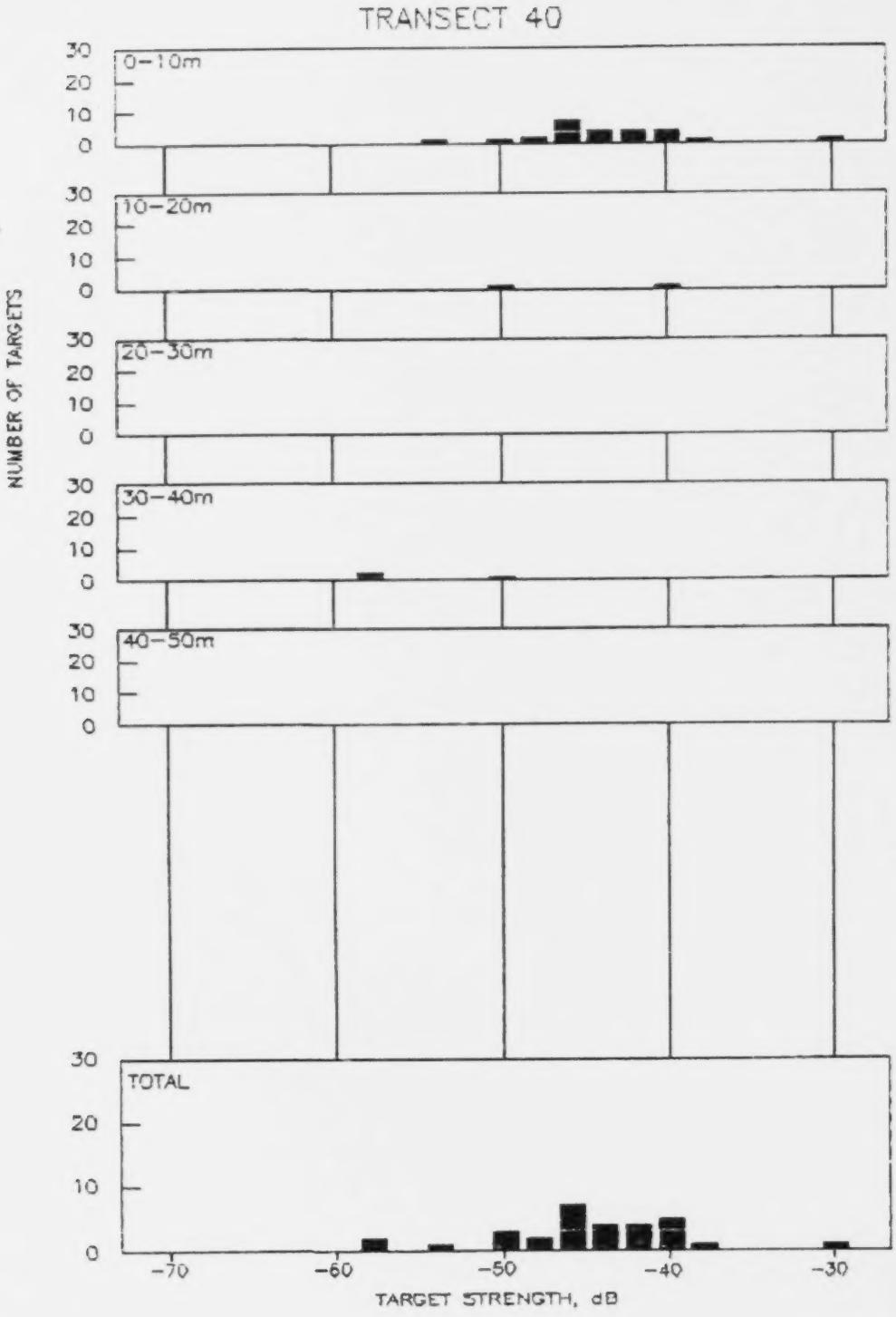

TRANSECT 30
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

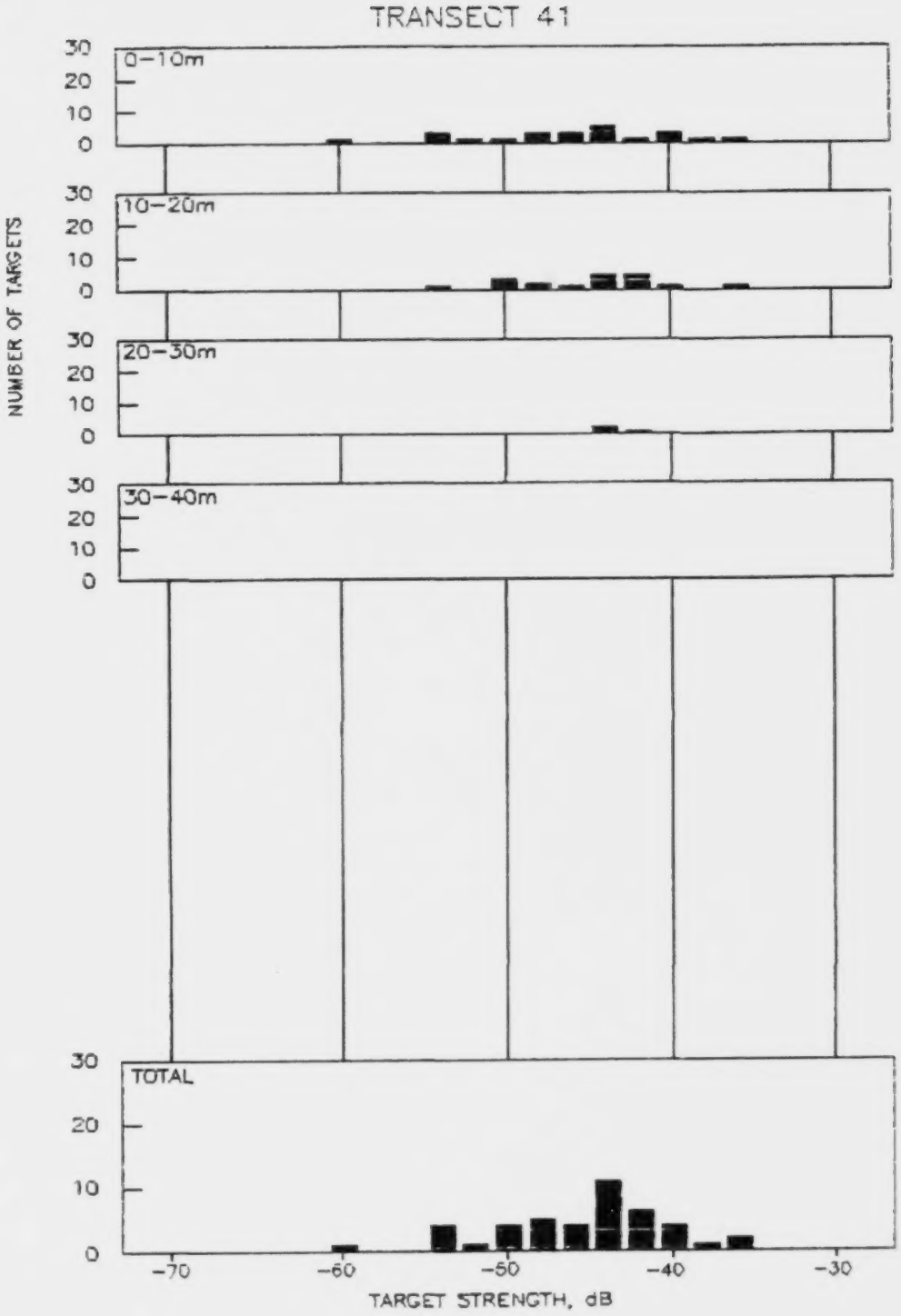

TRANSECT 32
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

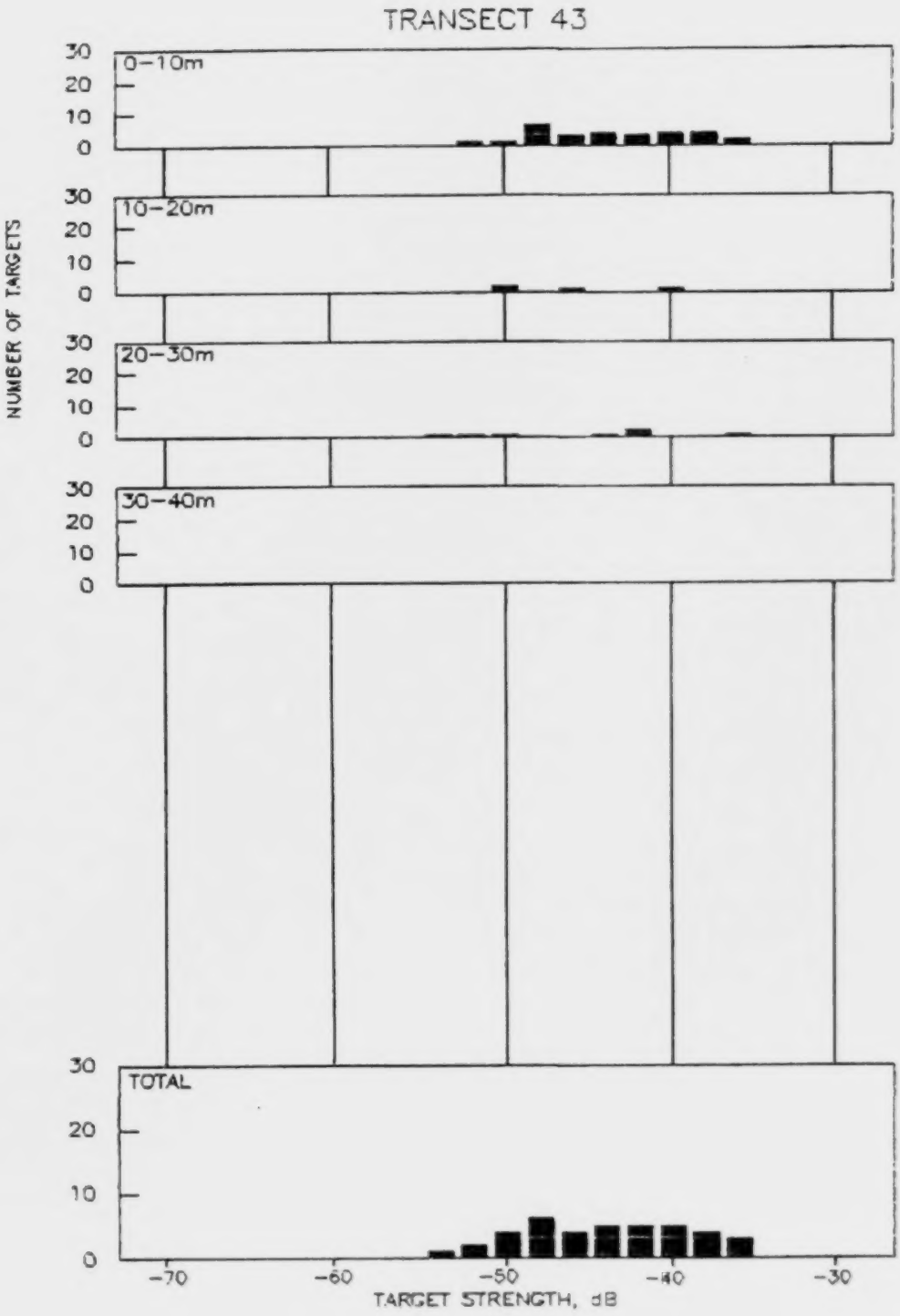

TRANSECT 36
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

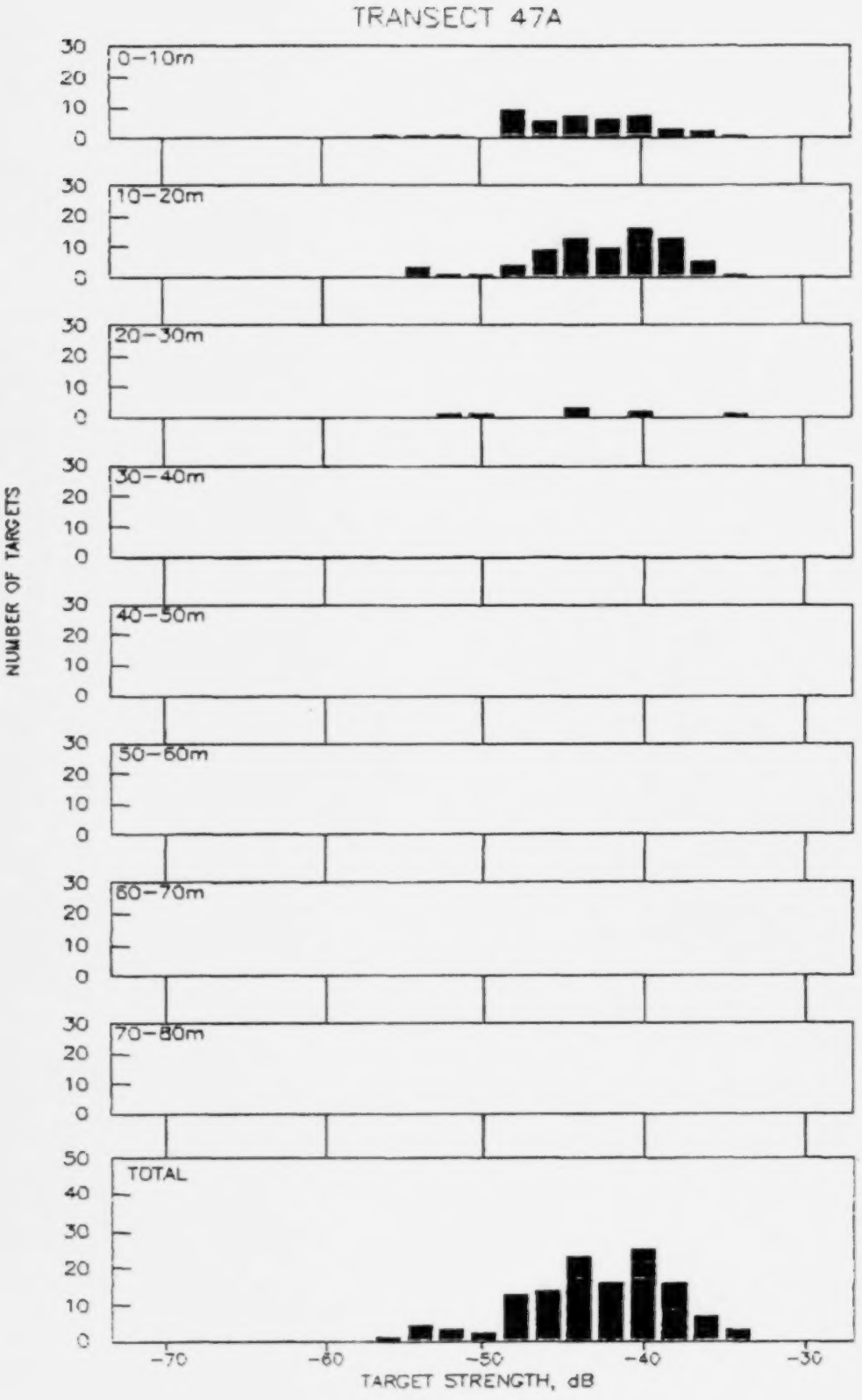

TRANSECT 37
NUMBER OF TARGETS
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
−70
−60
−50
−40
−30
TRAGET STRENGTH, dB

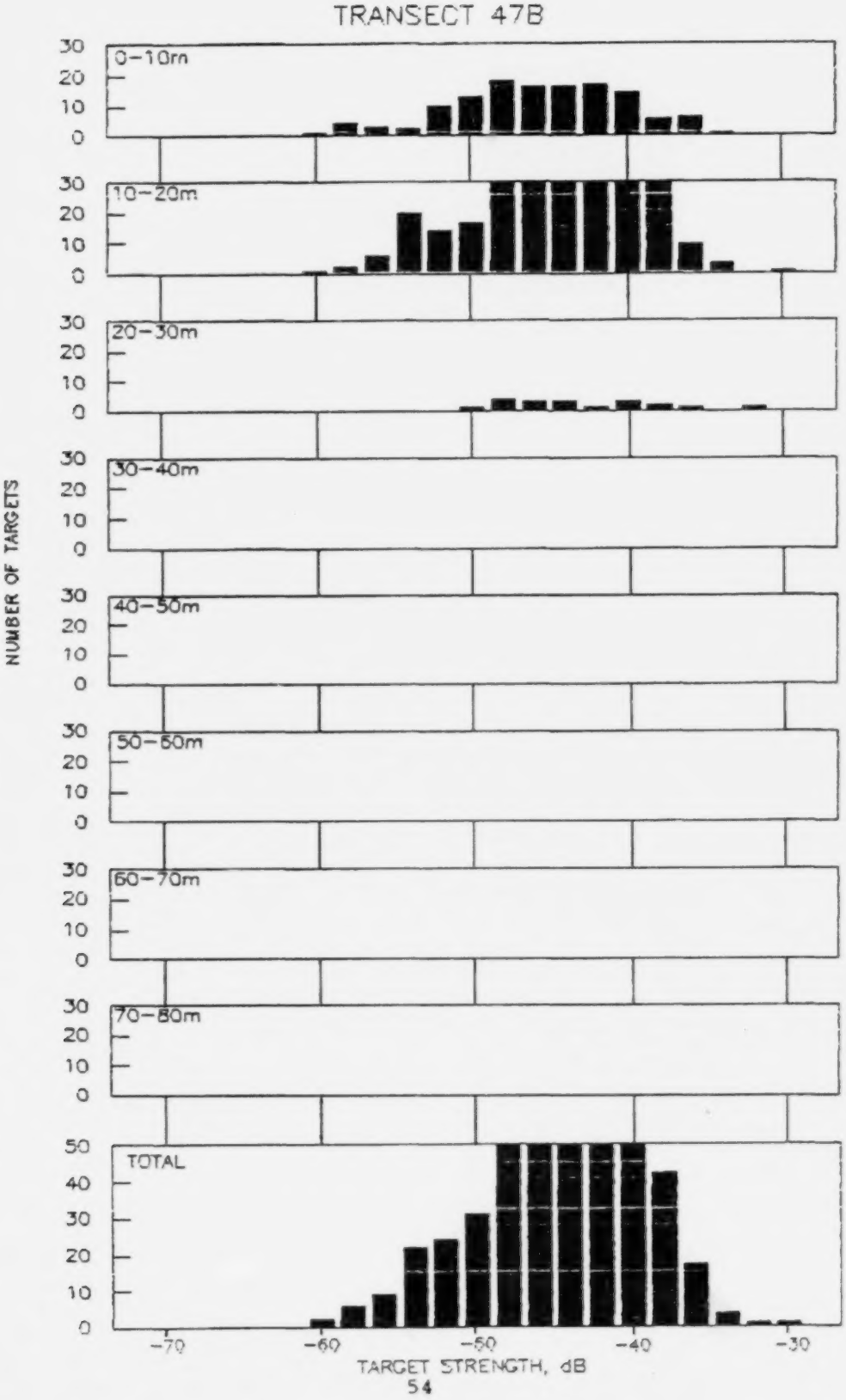

TRANSECT 39
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

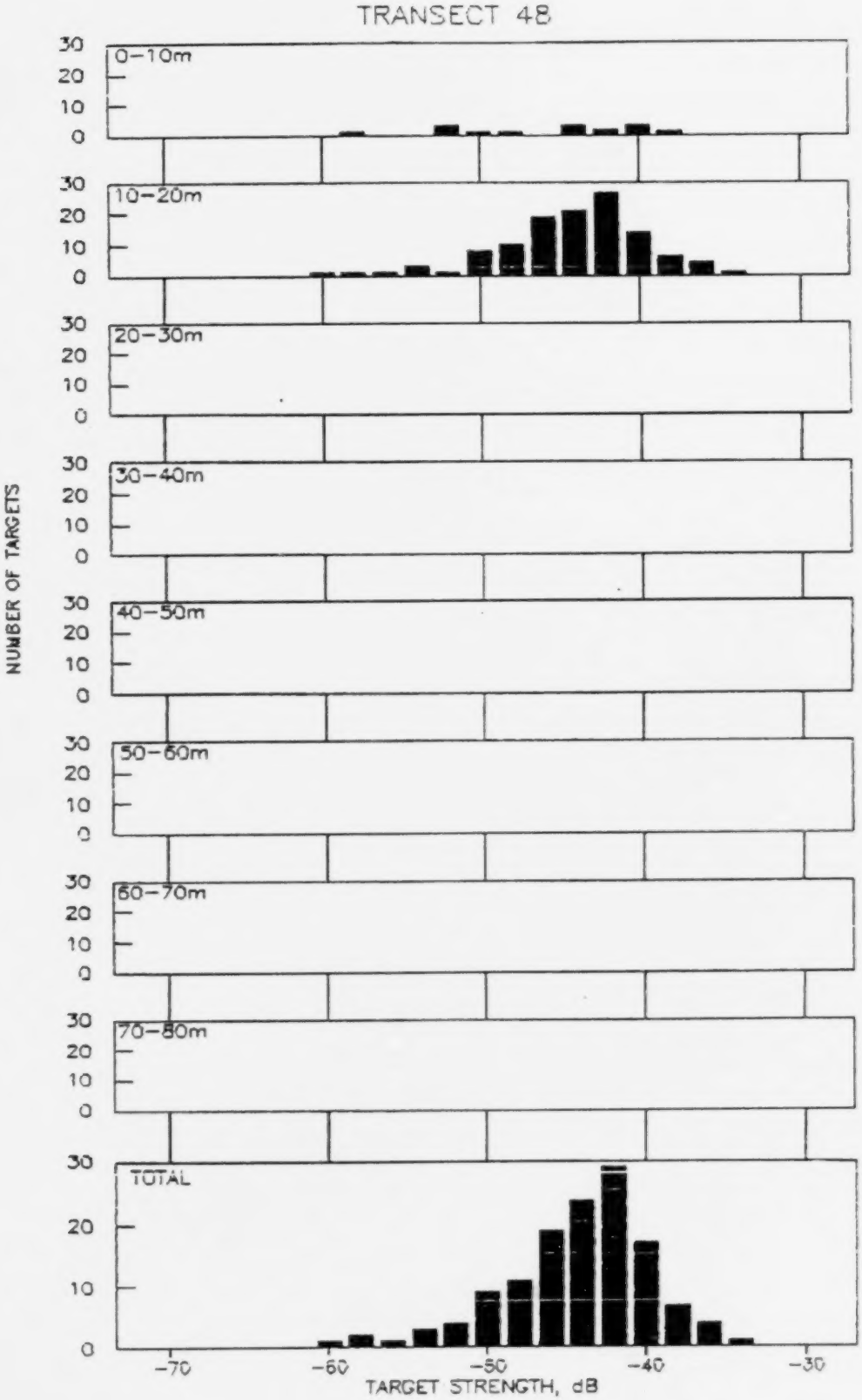

TRANSECT 40
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

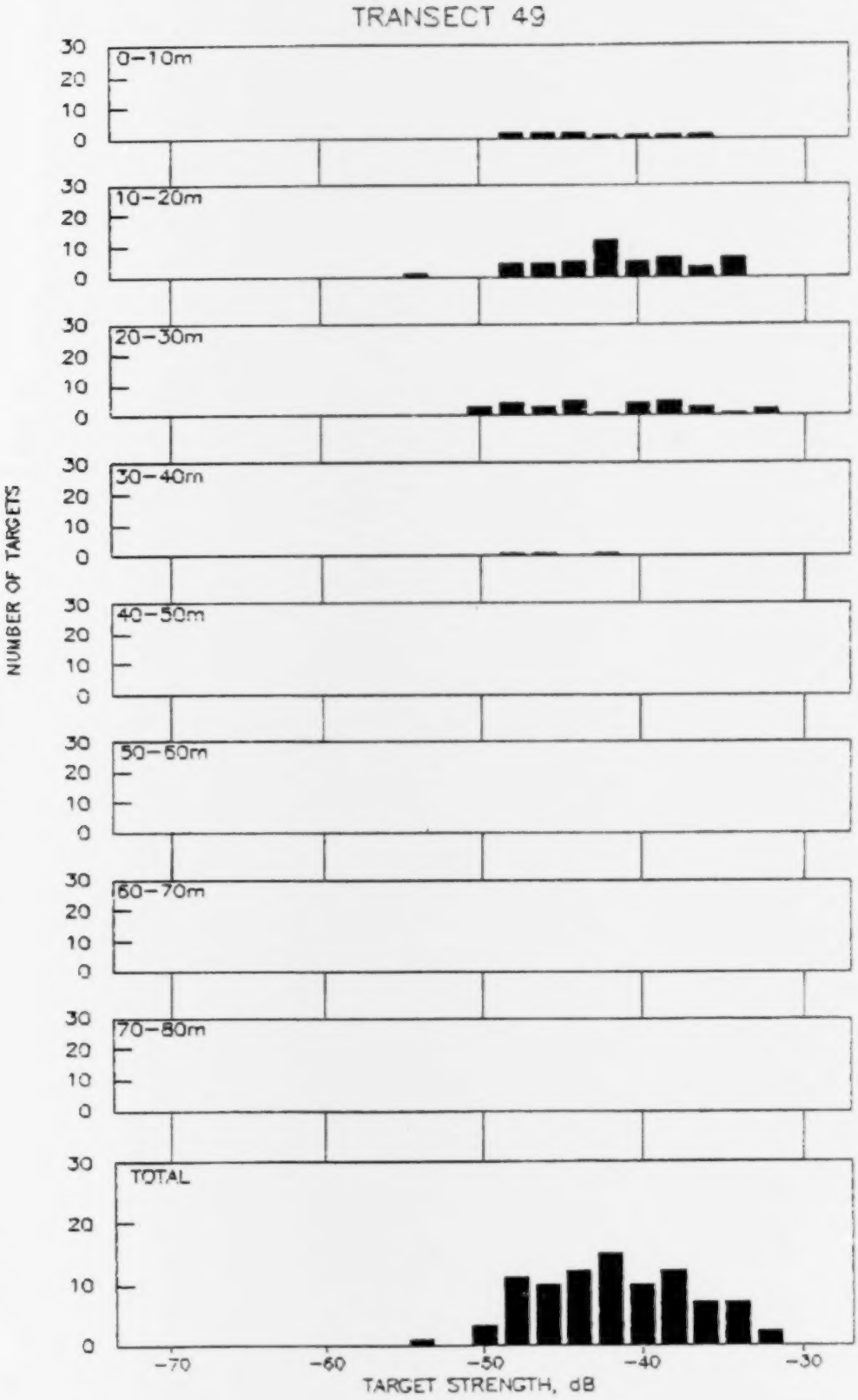

TRANSECT 41
NUMBER OF TARGETS
0–10m
10–20m
20–30m
30–40m
TOTAL
30
20
10
0
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

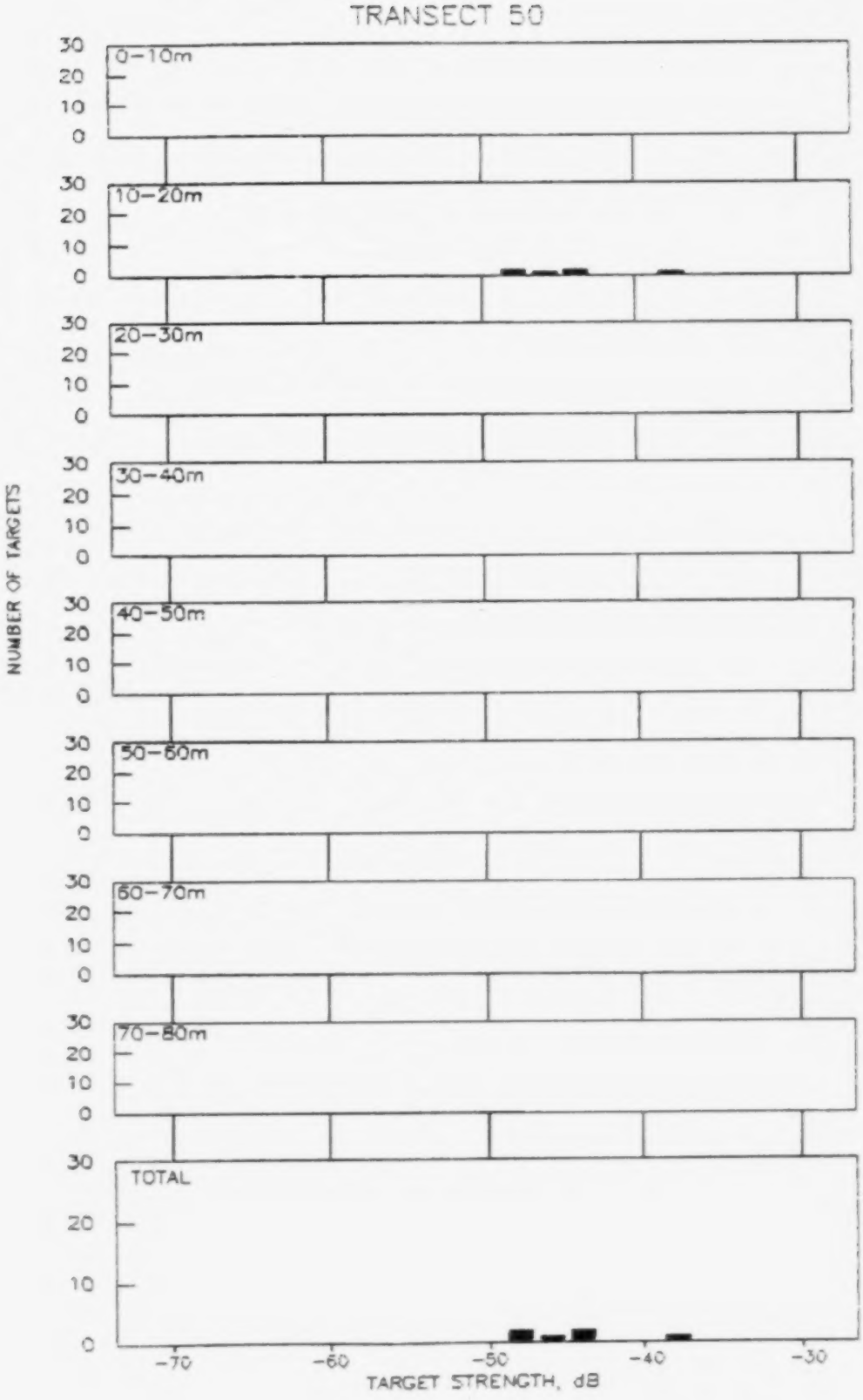

TRANSECT 43
NUMBER OF TARGETS
0–10m
10–20m
20–30m
30–40m
TOTAL
30
20
10
0
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

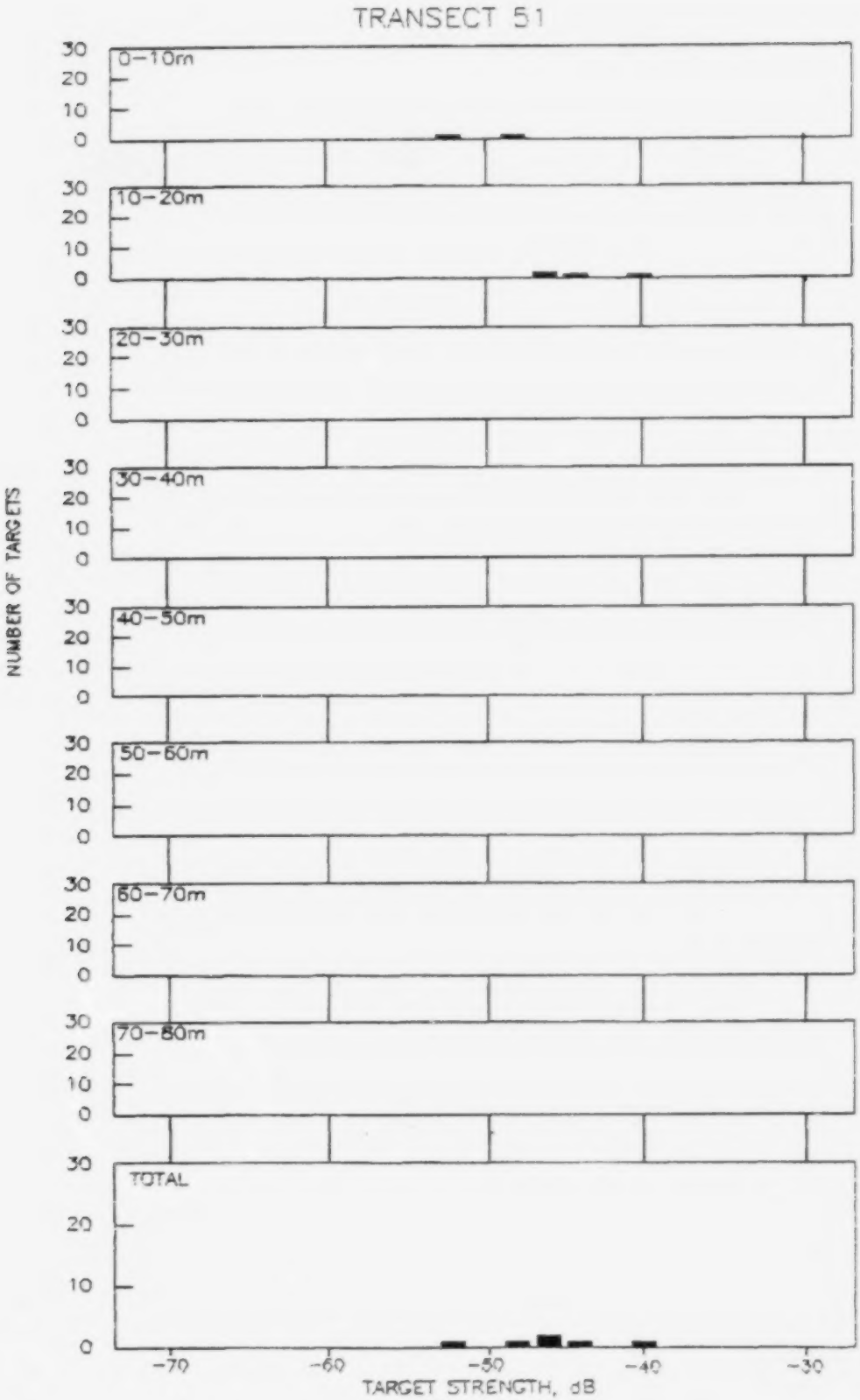

TRANSECT 47A
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

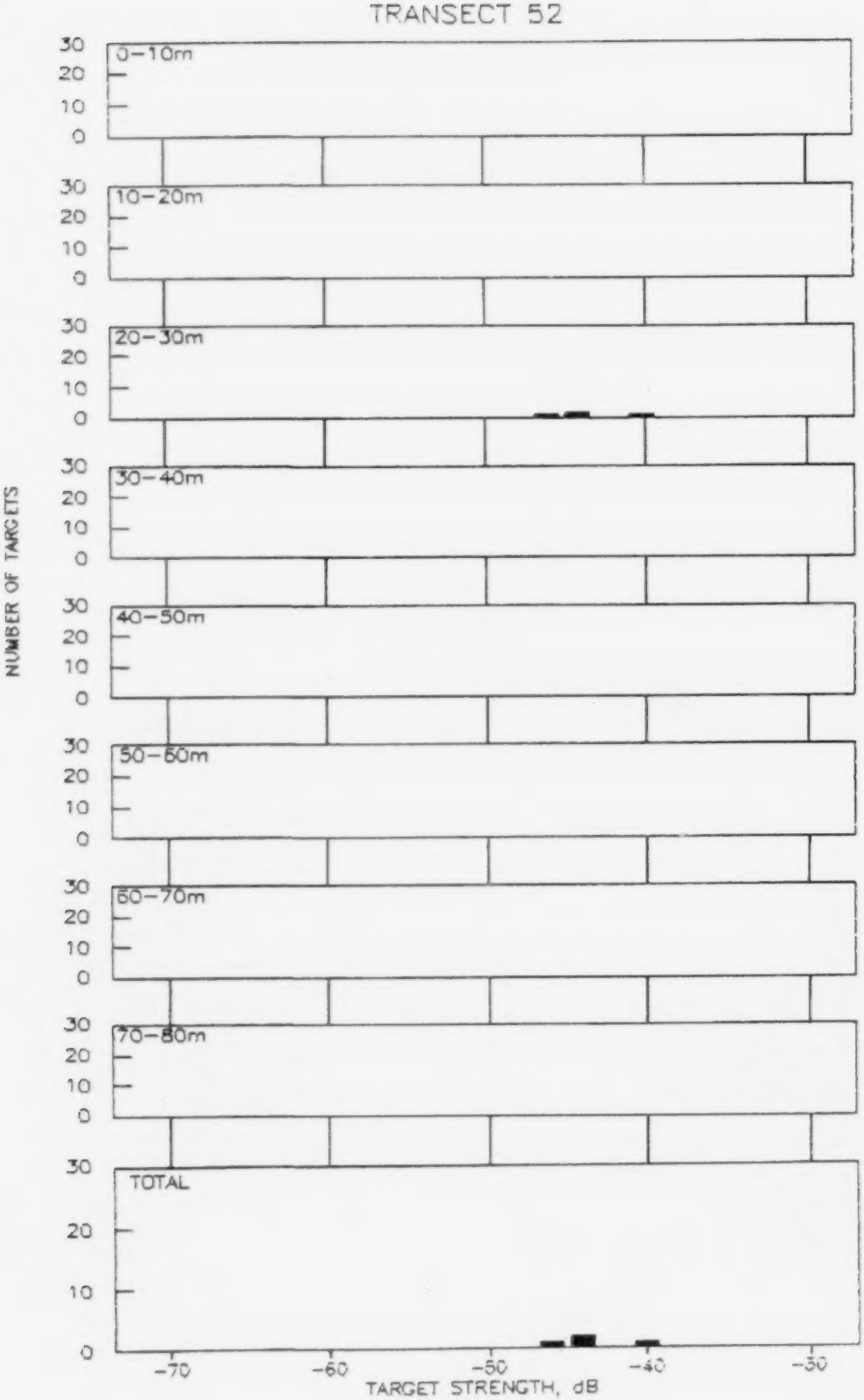

TRANSECT 47B
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

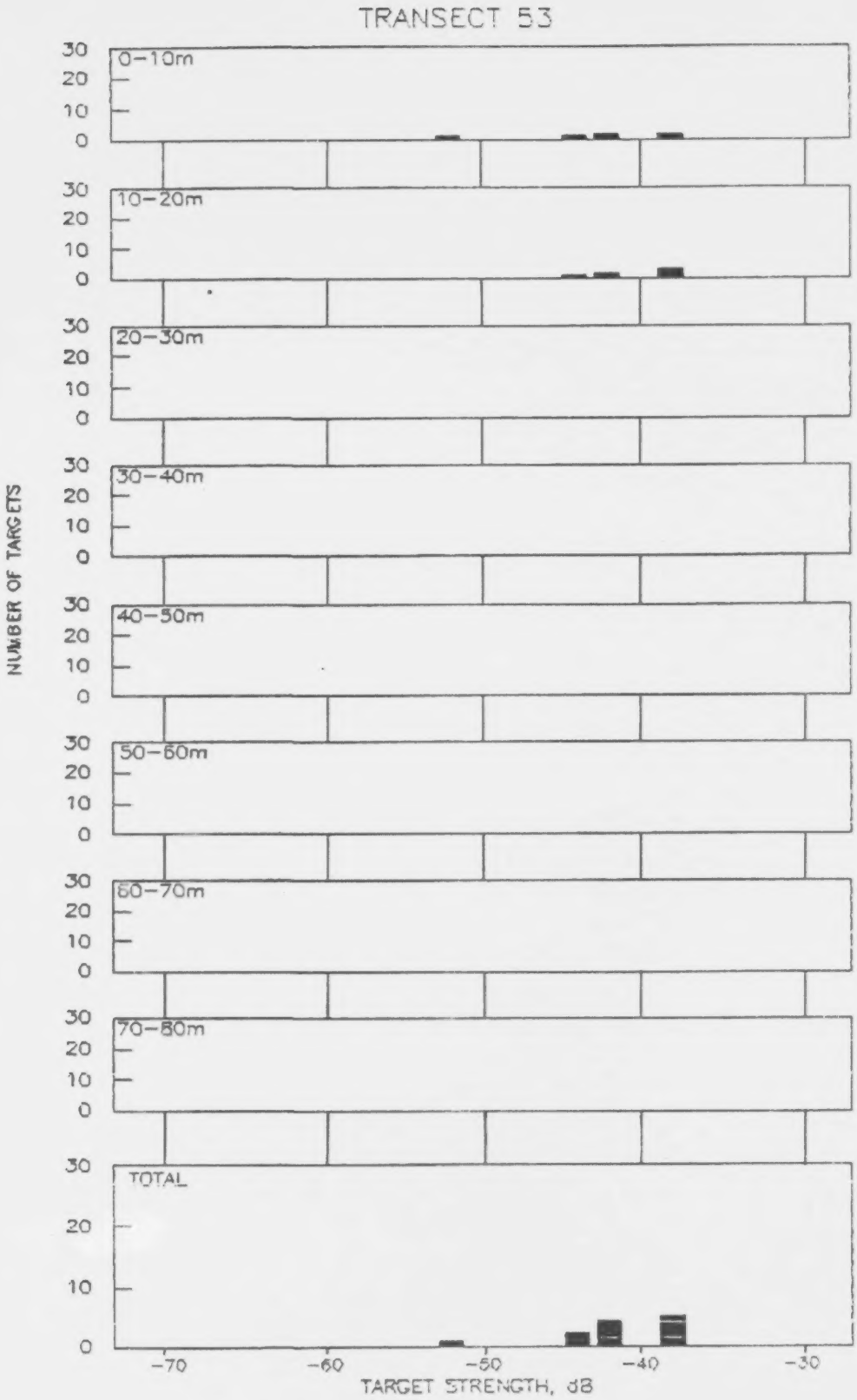

TRANSECT 48
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

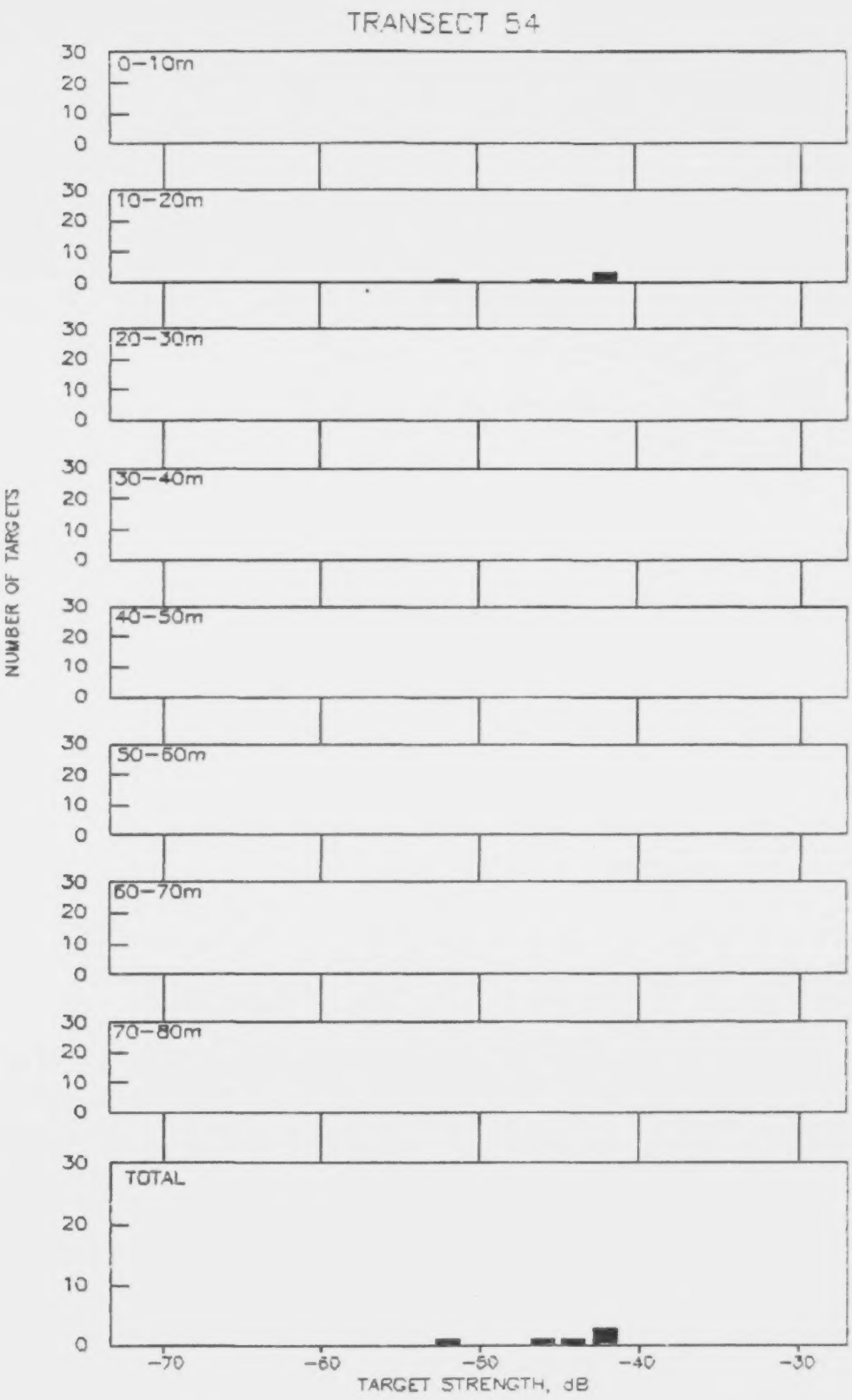

TRANSECT 49
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

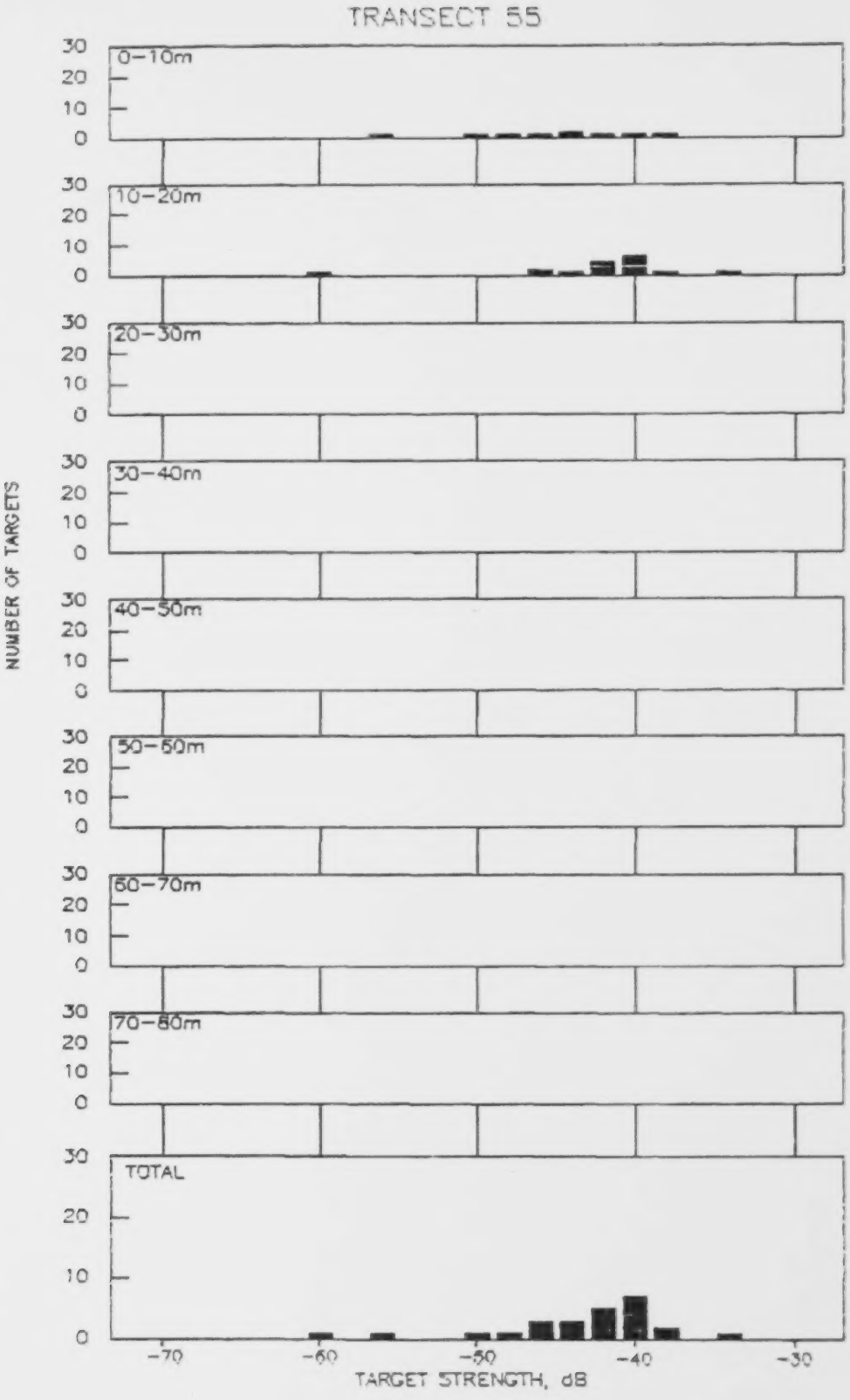

TRANSECT 50
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

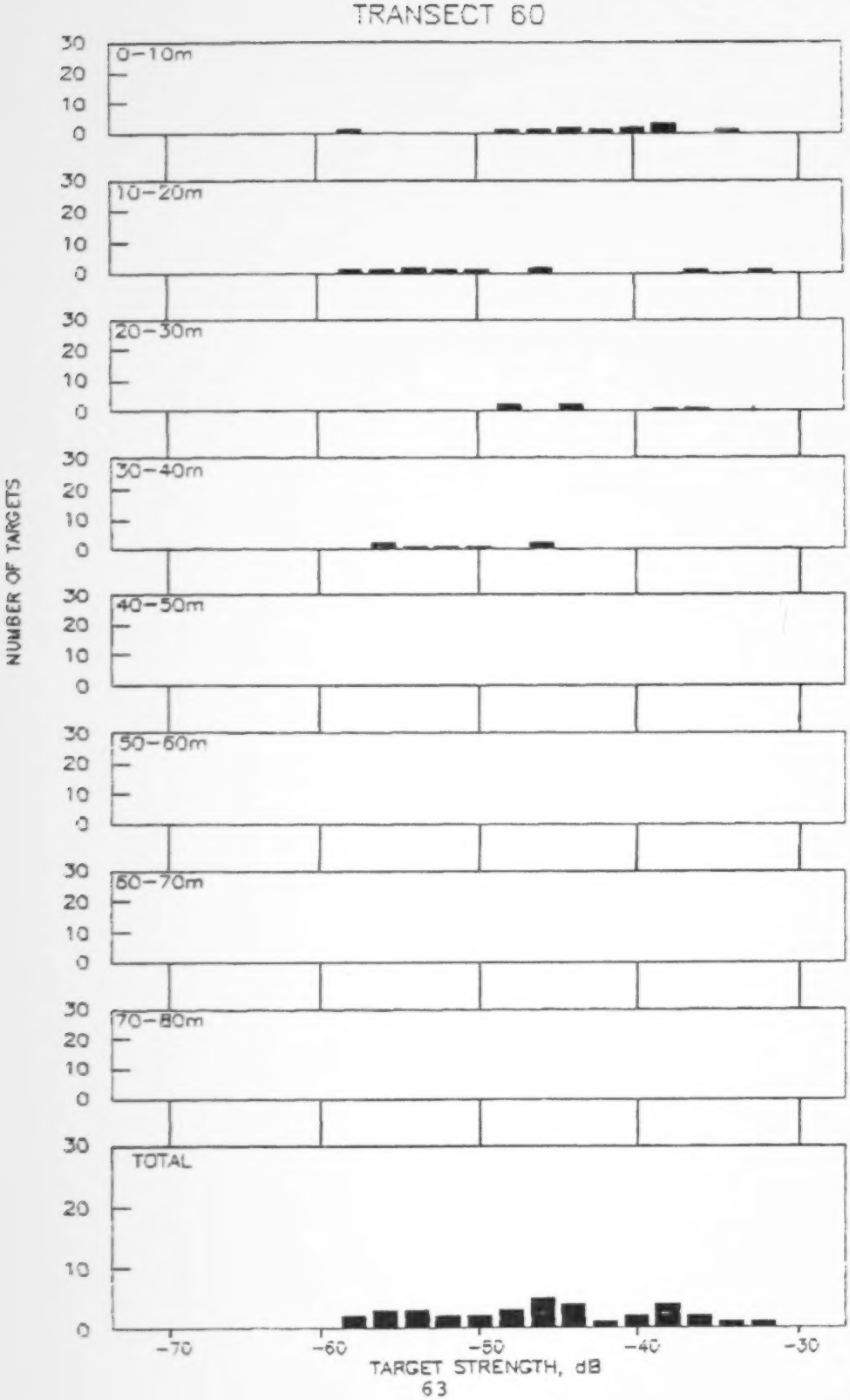

TRANSECT 51
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

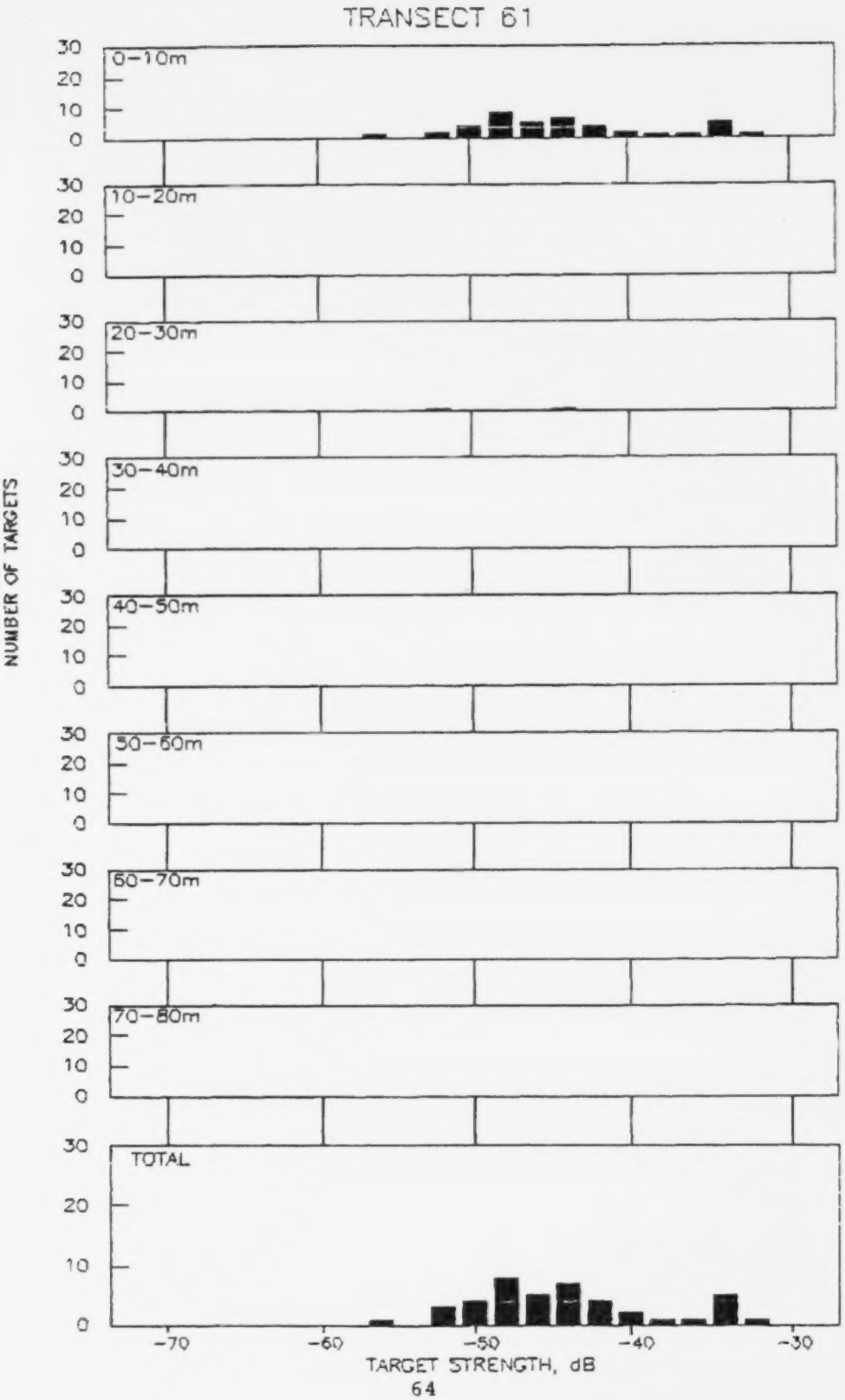

TRANSECT 52
0-10m
10-20m
20-30m
30-40m
40-50m
50-60m
60-70m
70-80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

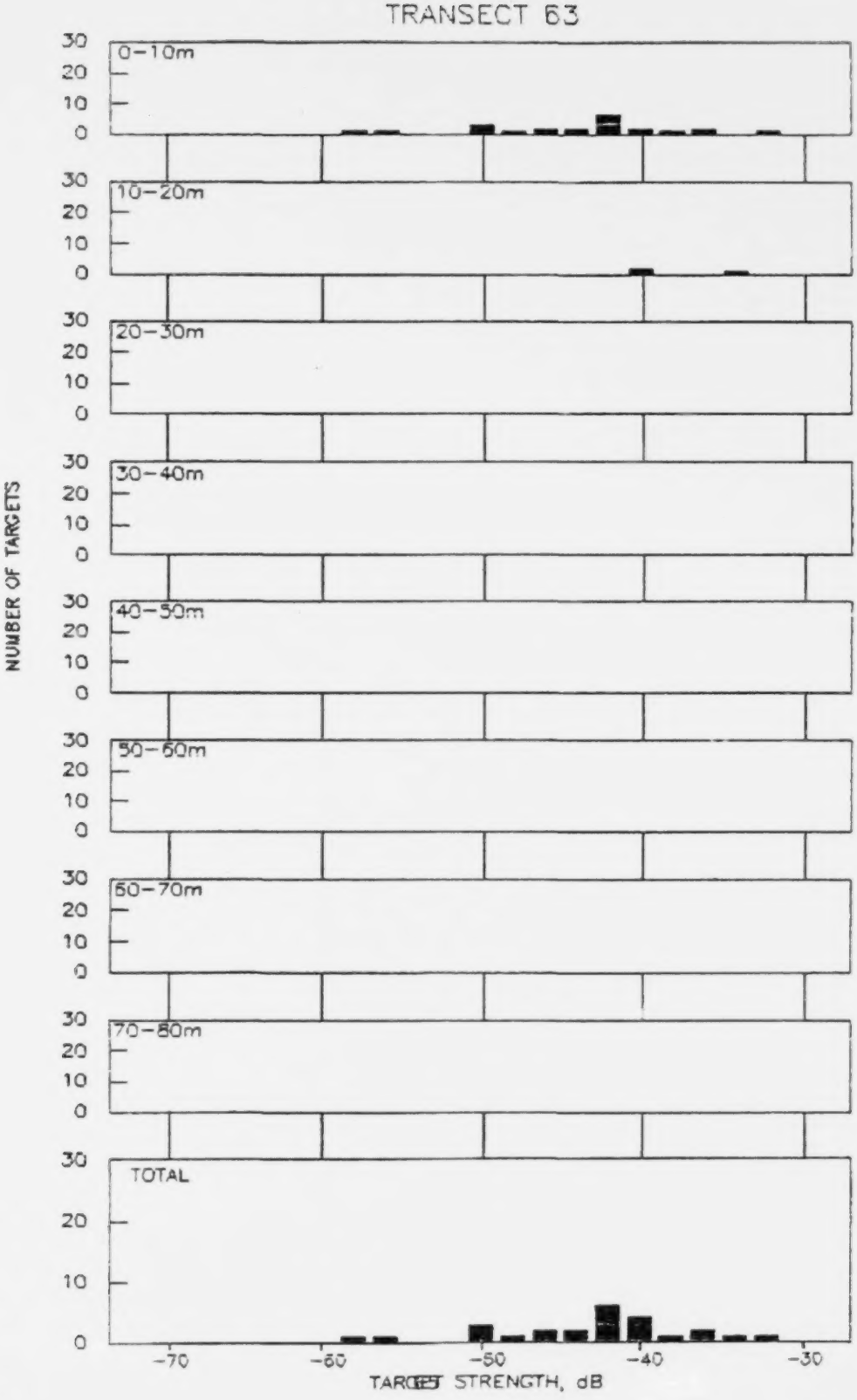

TRANSECT 53
0-10m
10-20m
20-30m
30-40m
40-50m
50-60m
60-70m
70-80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

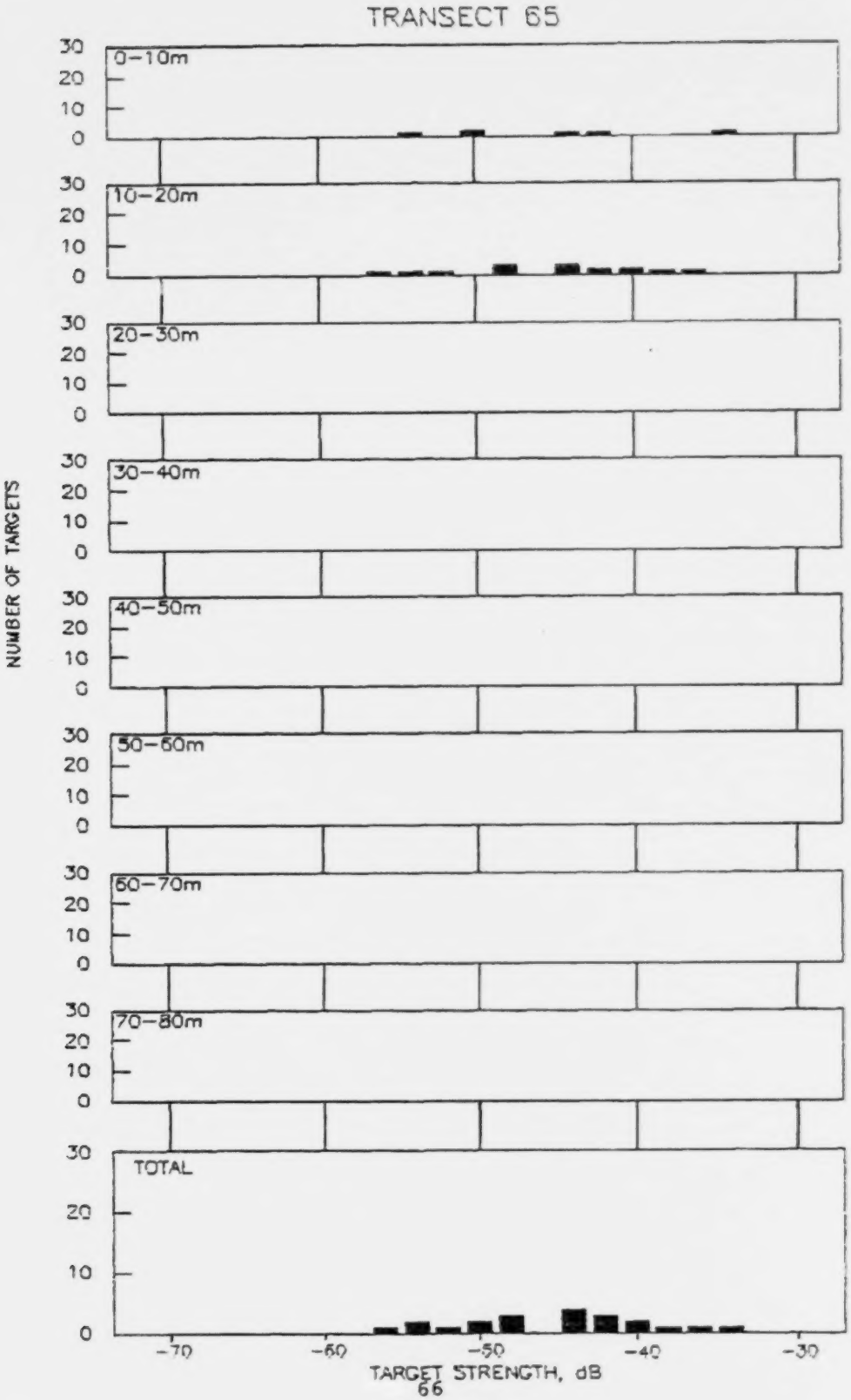

TRANSECT 54
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

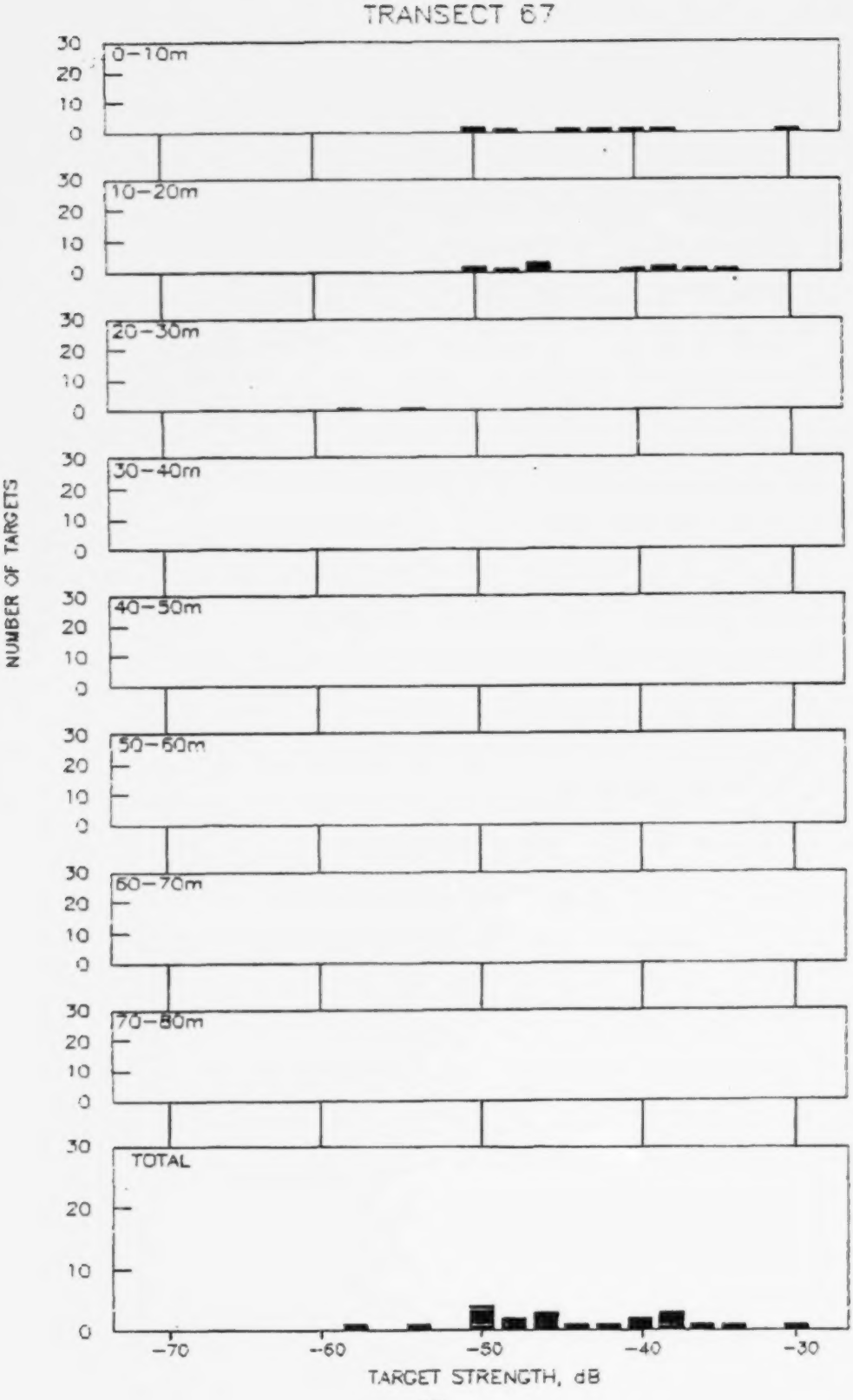

TRANSECT 55
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

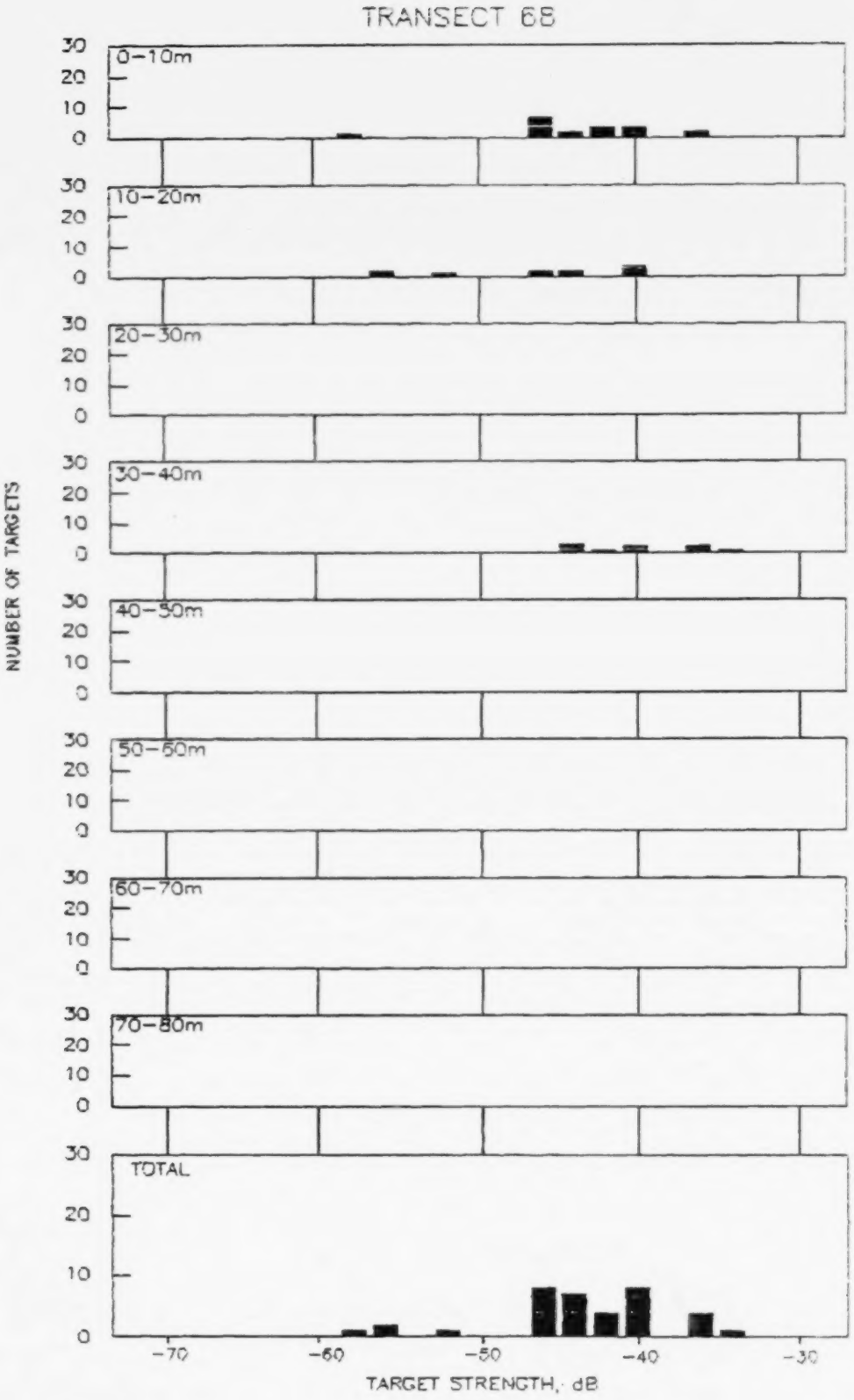

TRANSECT 60
0-10m
10-20m
20-30m
30-40m
40-50m
50-60m
60-70m
70-80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

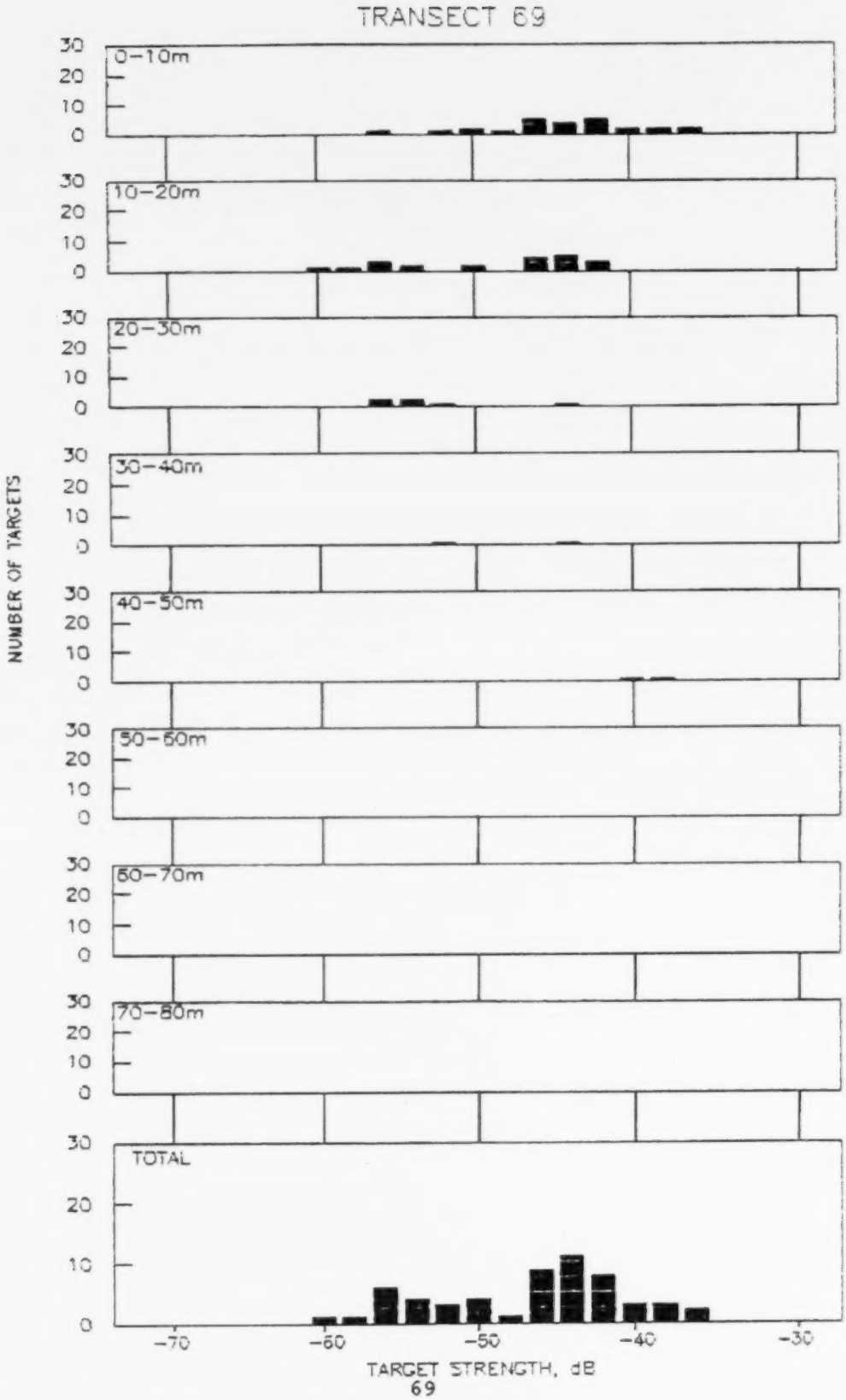

TRANSECT 61
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB


TRANSECT 63
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
50–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB


TRANSECT 65
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB


TRANSECT 67
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB


TRANSECT 68
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB


TRANSECT 69
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
NUMBER OF TARGETS
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

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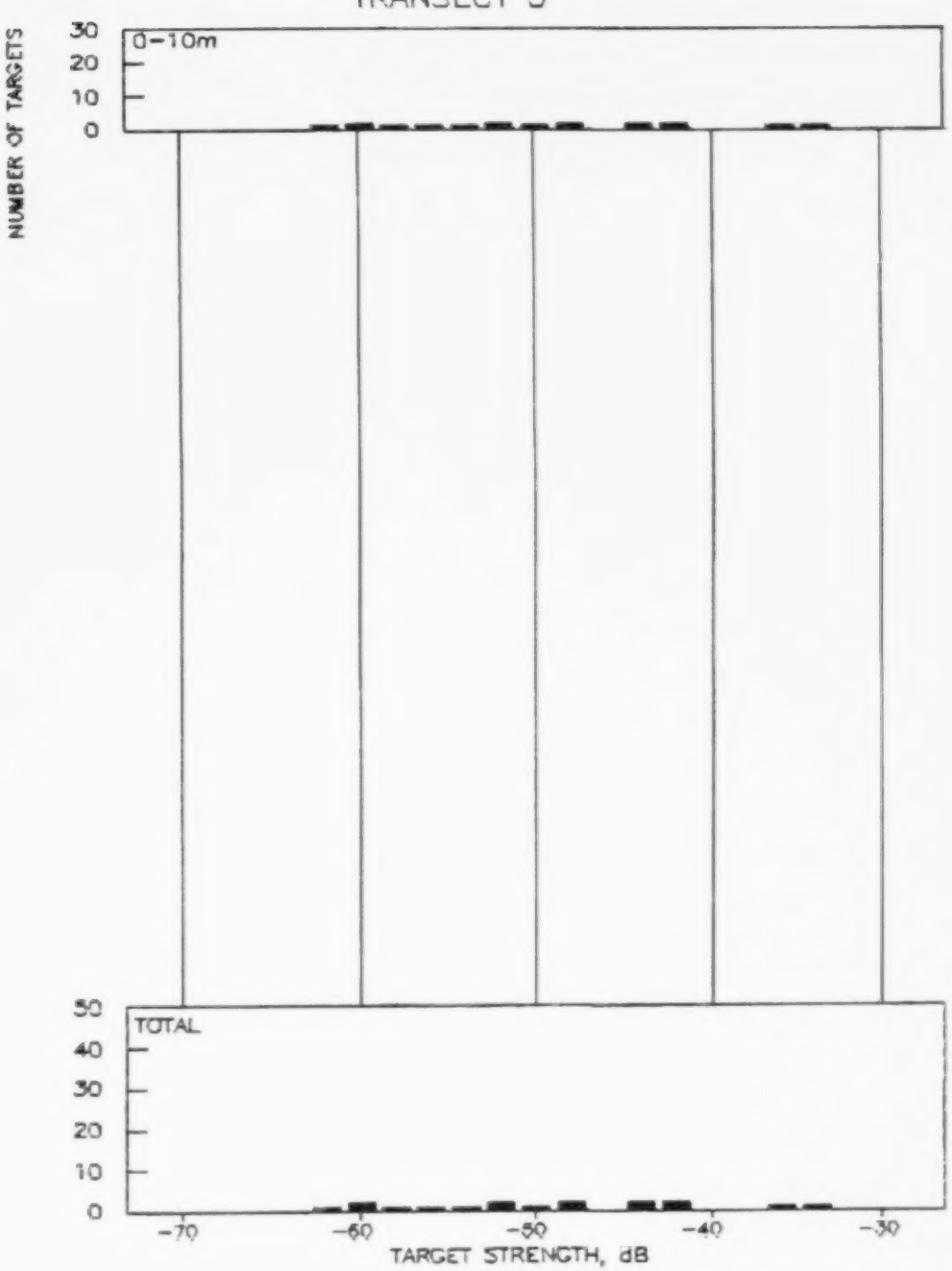
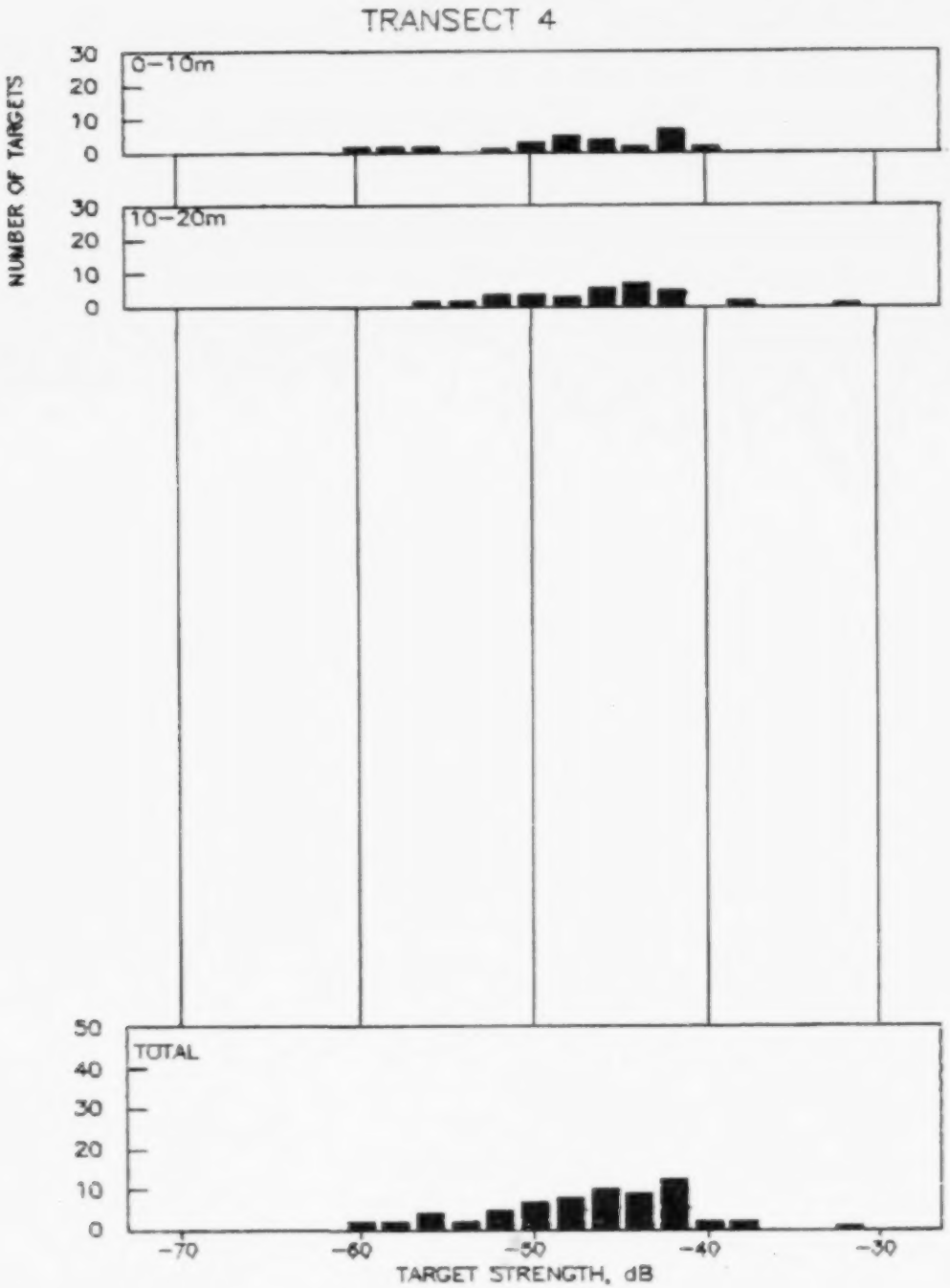
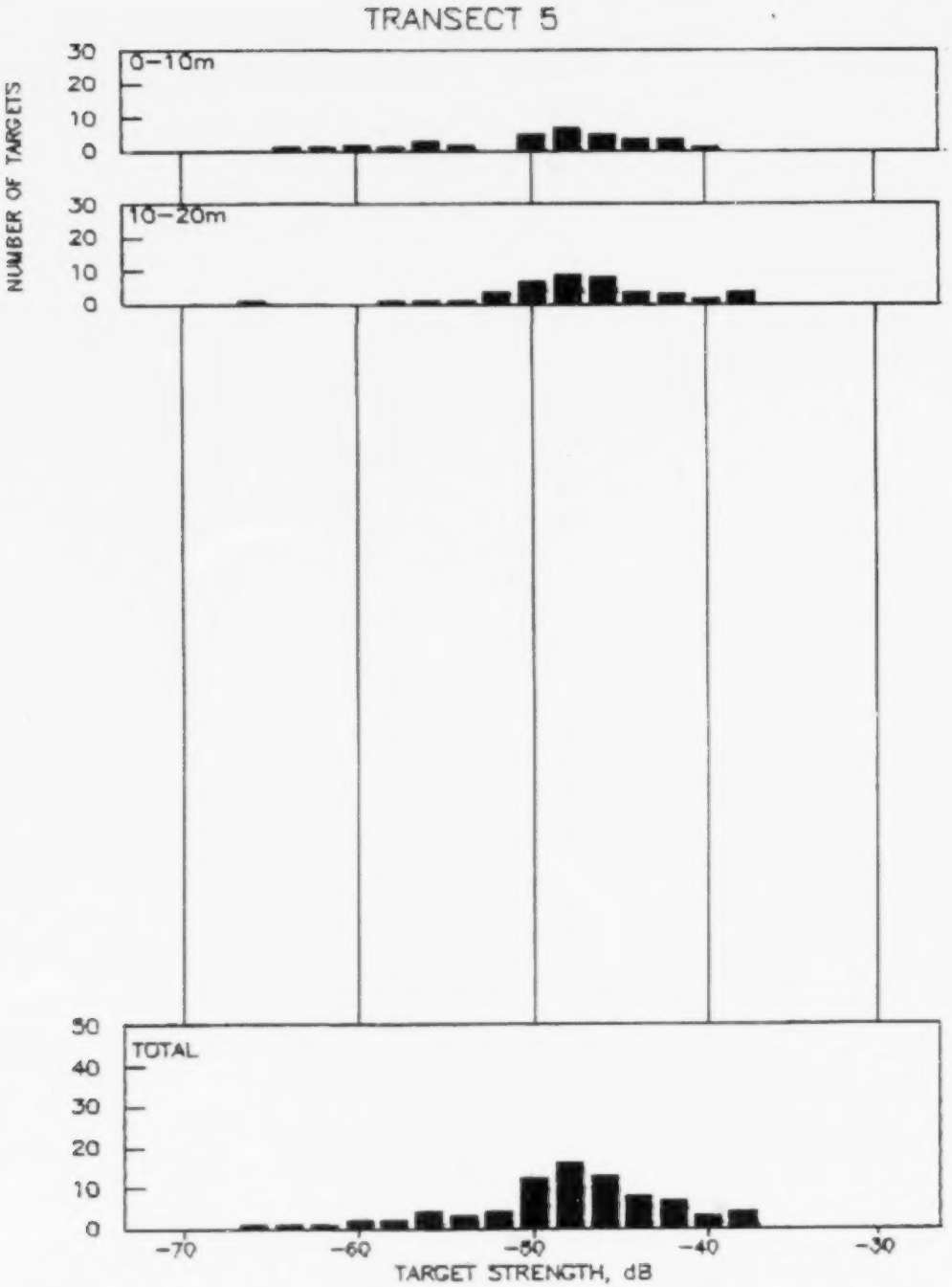
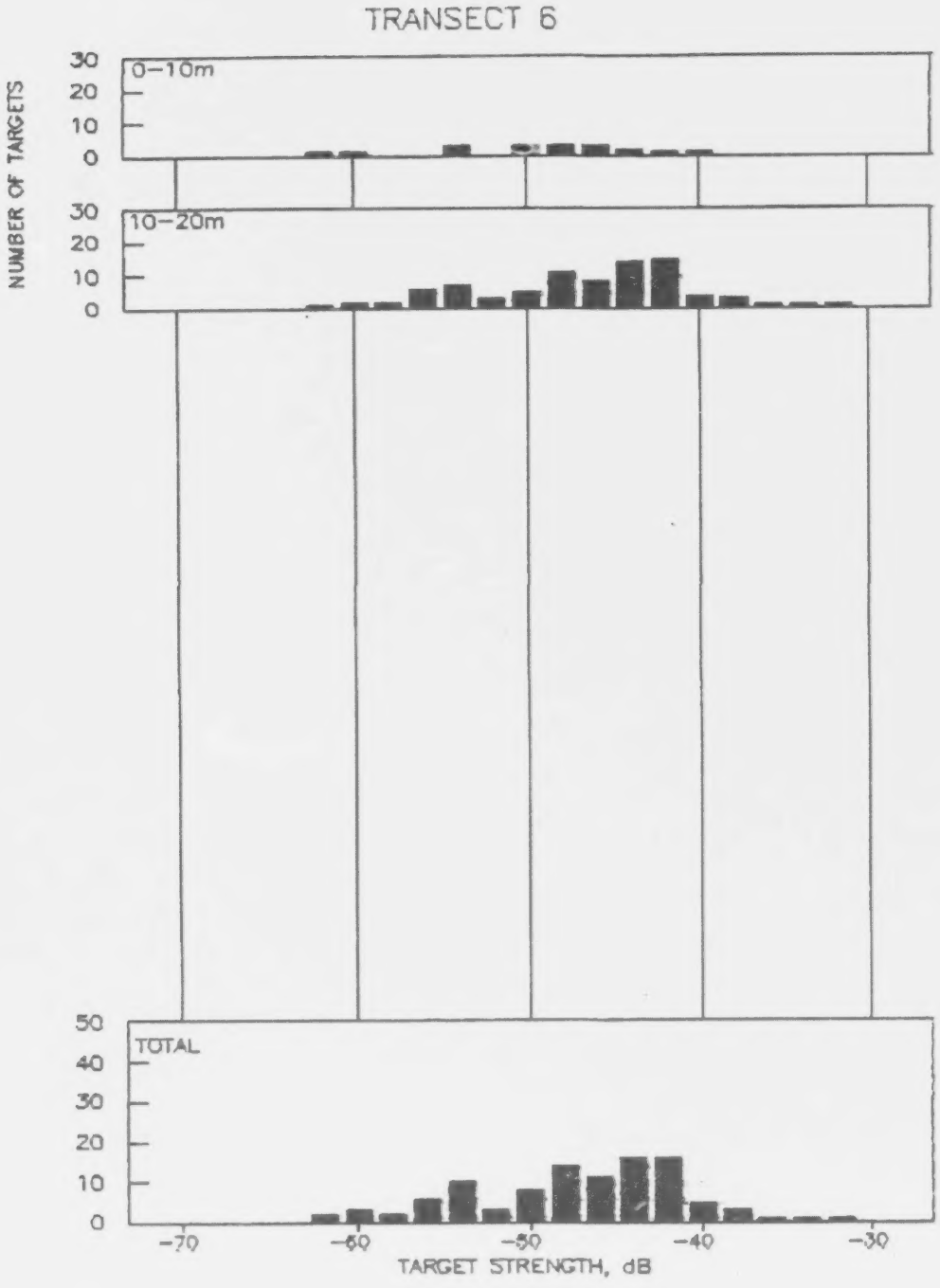
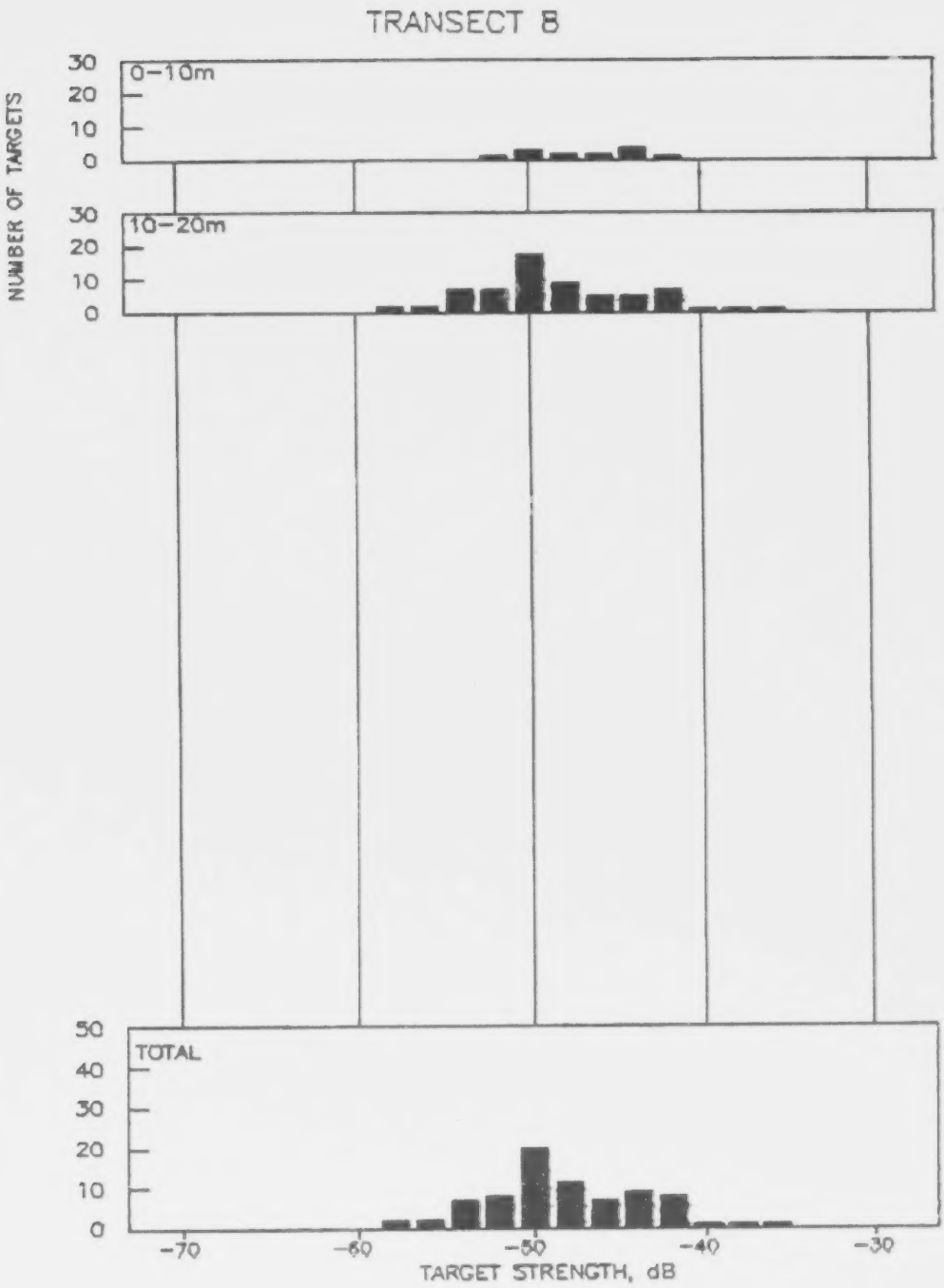
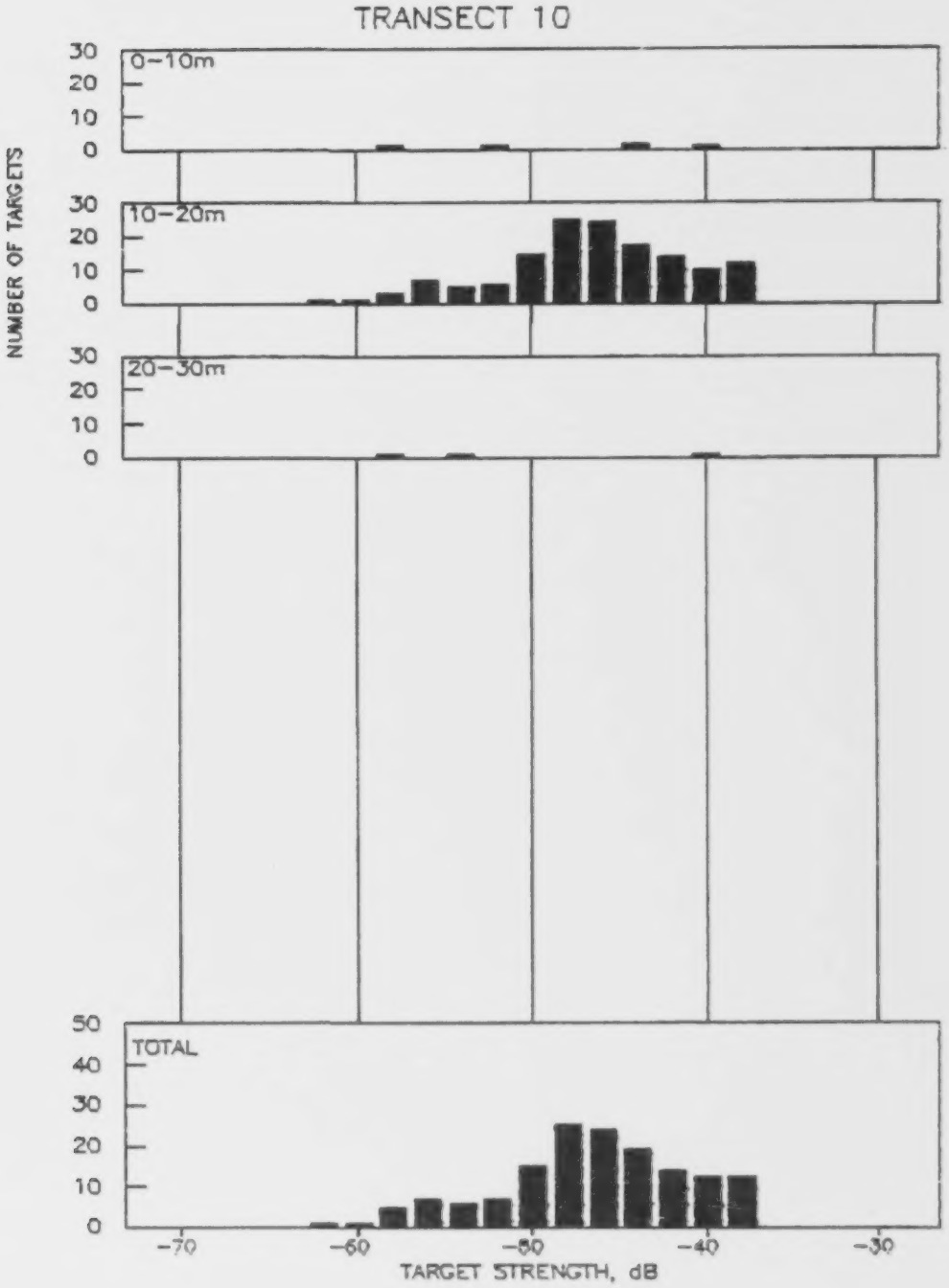

TRANSECT 3
NUMBER OF TARGETS
0-10m
30
20
10
0
TOTAL
50
40
30
20
10
0
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

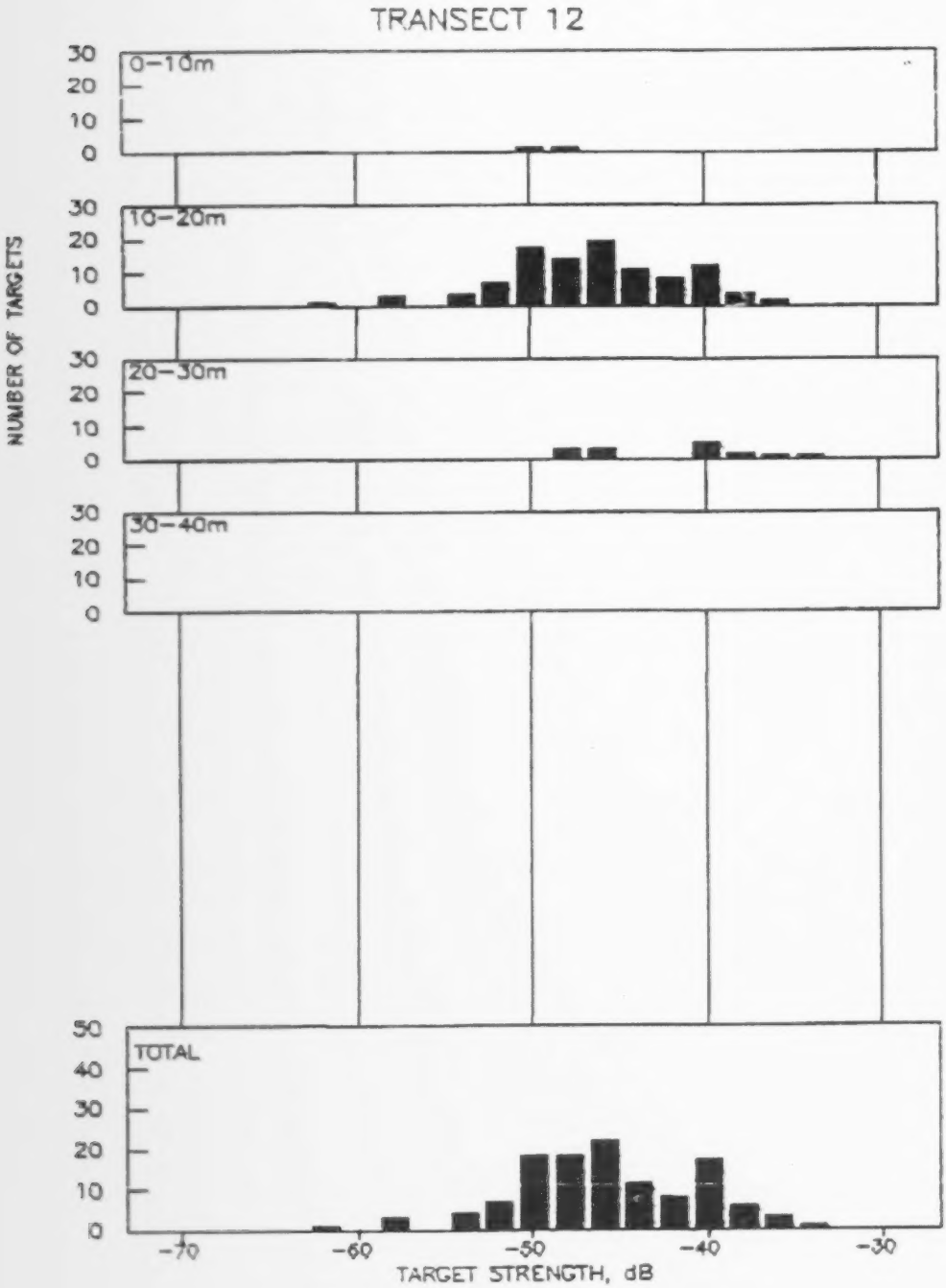

TRANSECT 4
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

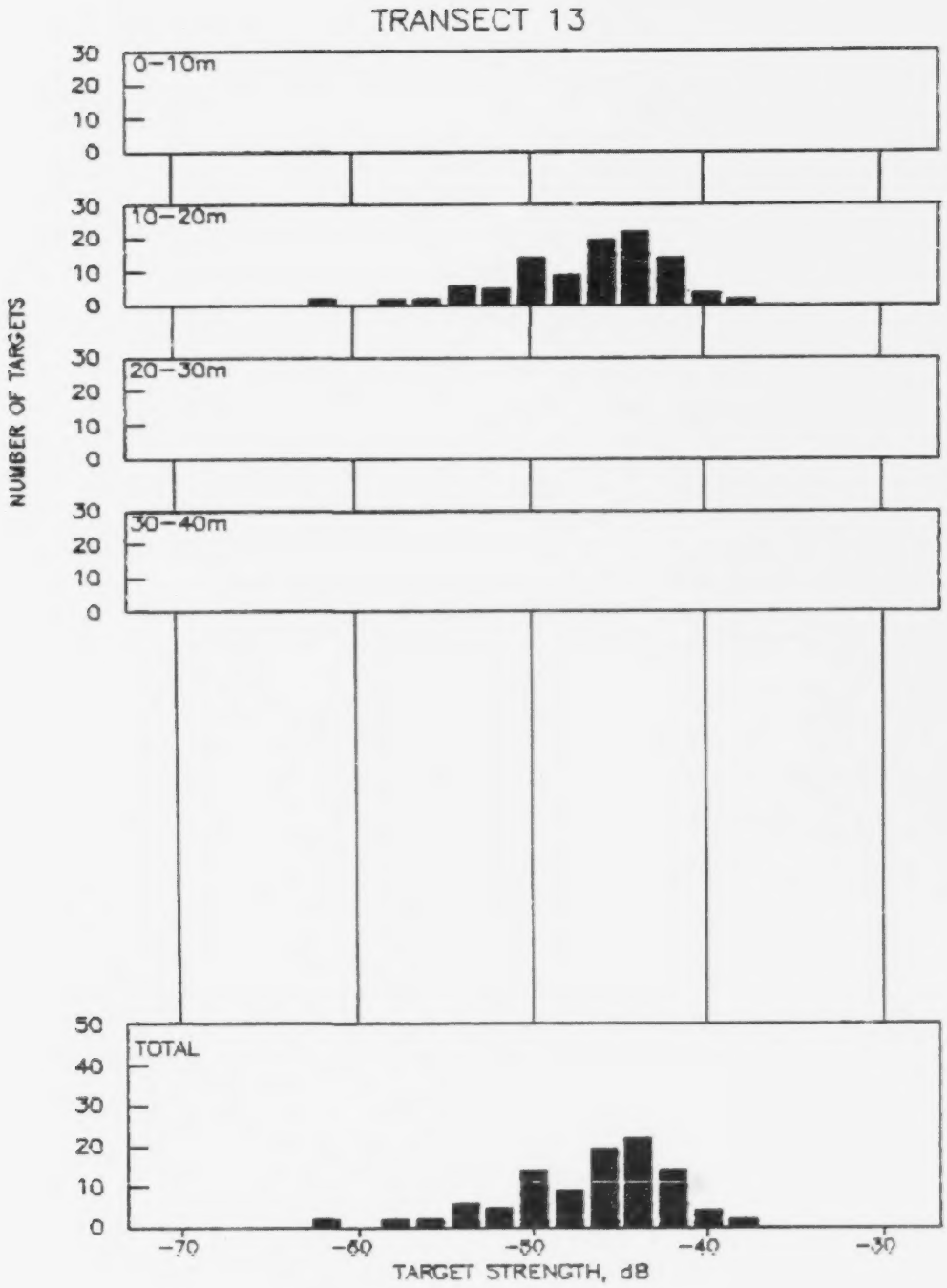

TRANSECT 5
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

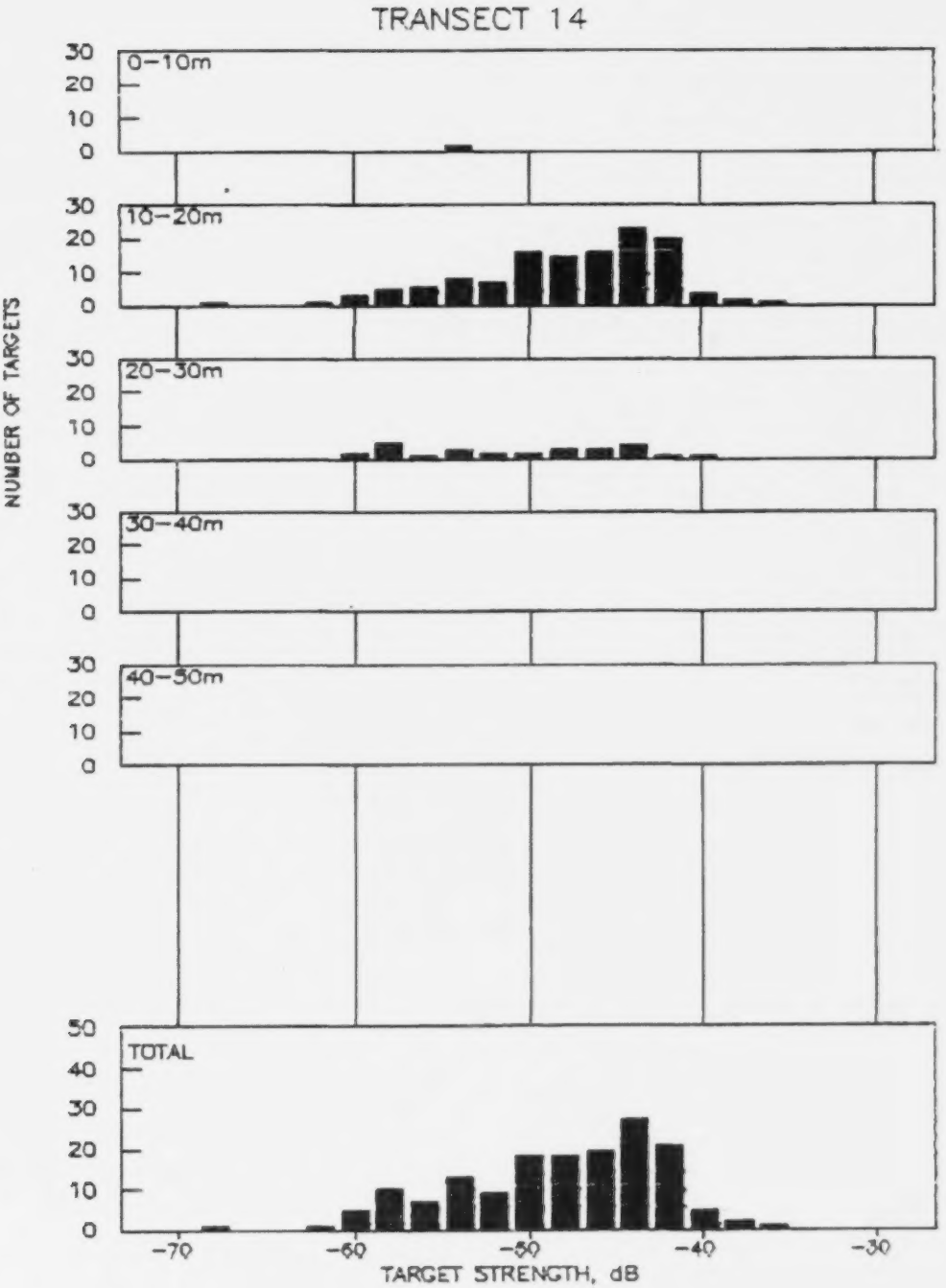

TRANSECT 6
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

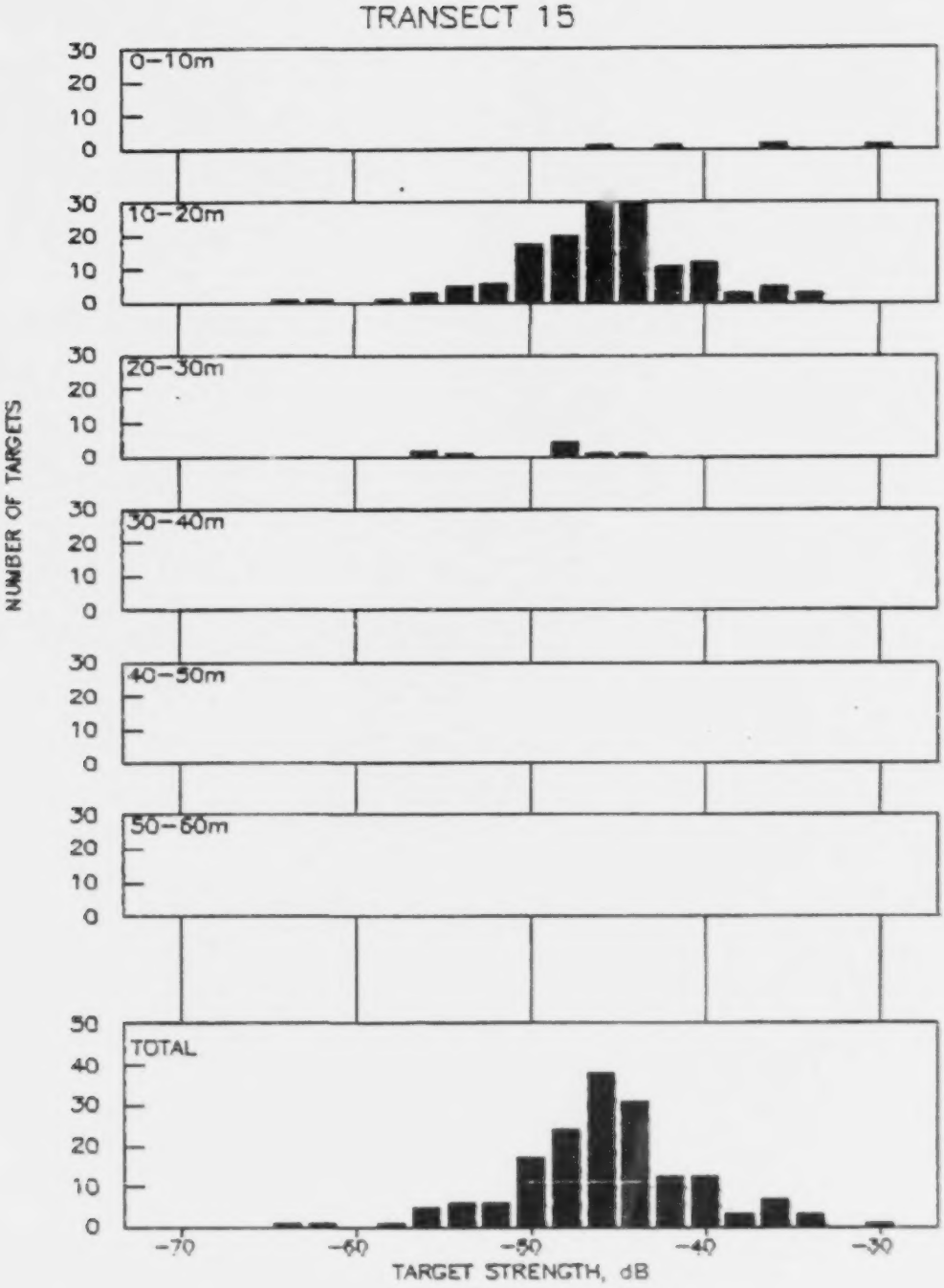

TRANSECT B
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

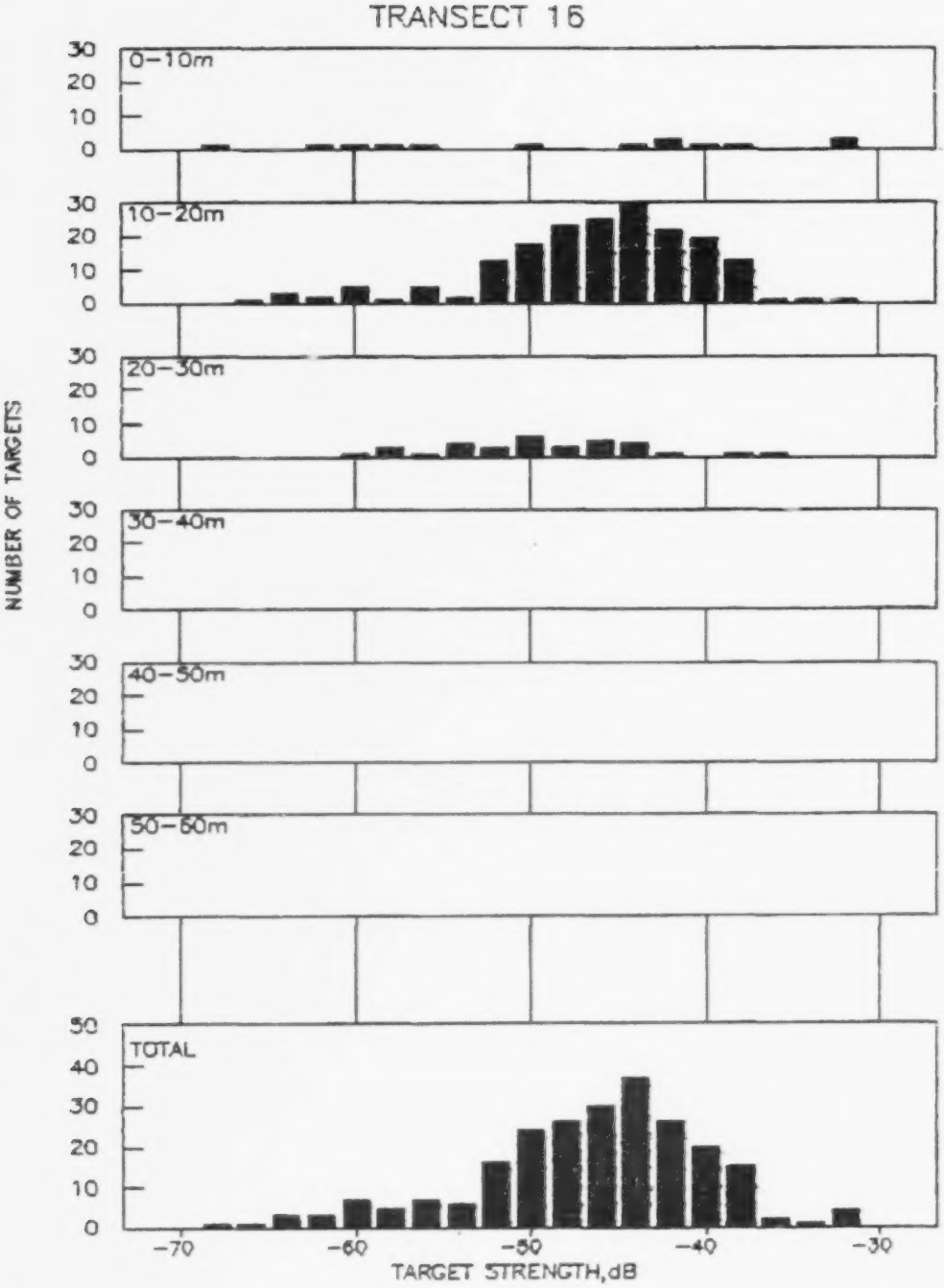

TRANSECT 10
0–10m
10–20m
20–30m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
30
20
10
0
50
40
−70
−60
−50
−40
−30

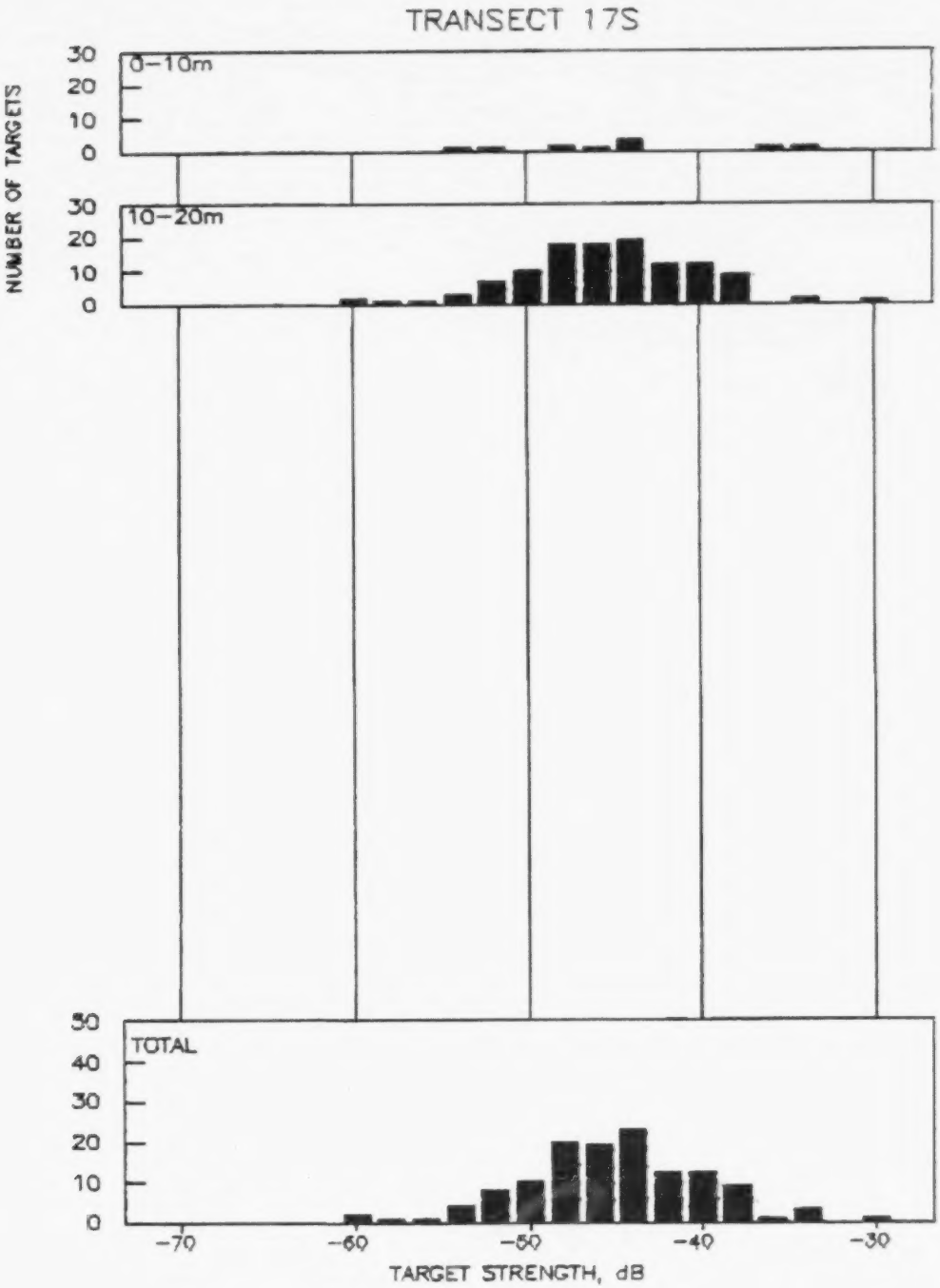

TRANSECT 12
NUMBER OF TARGETS
0–10m
10–20m
20–30m
30–40m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

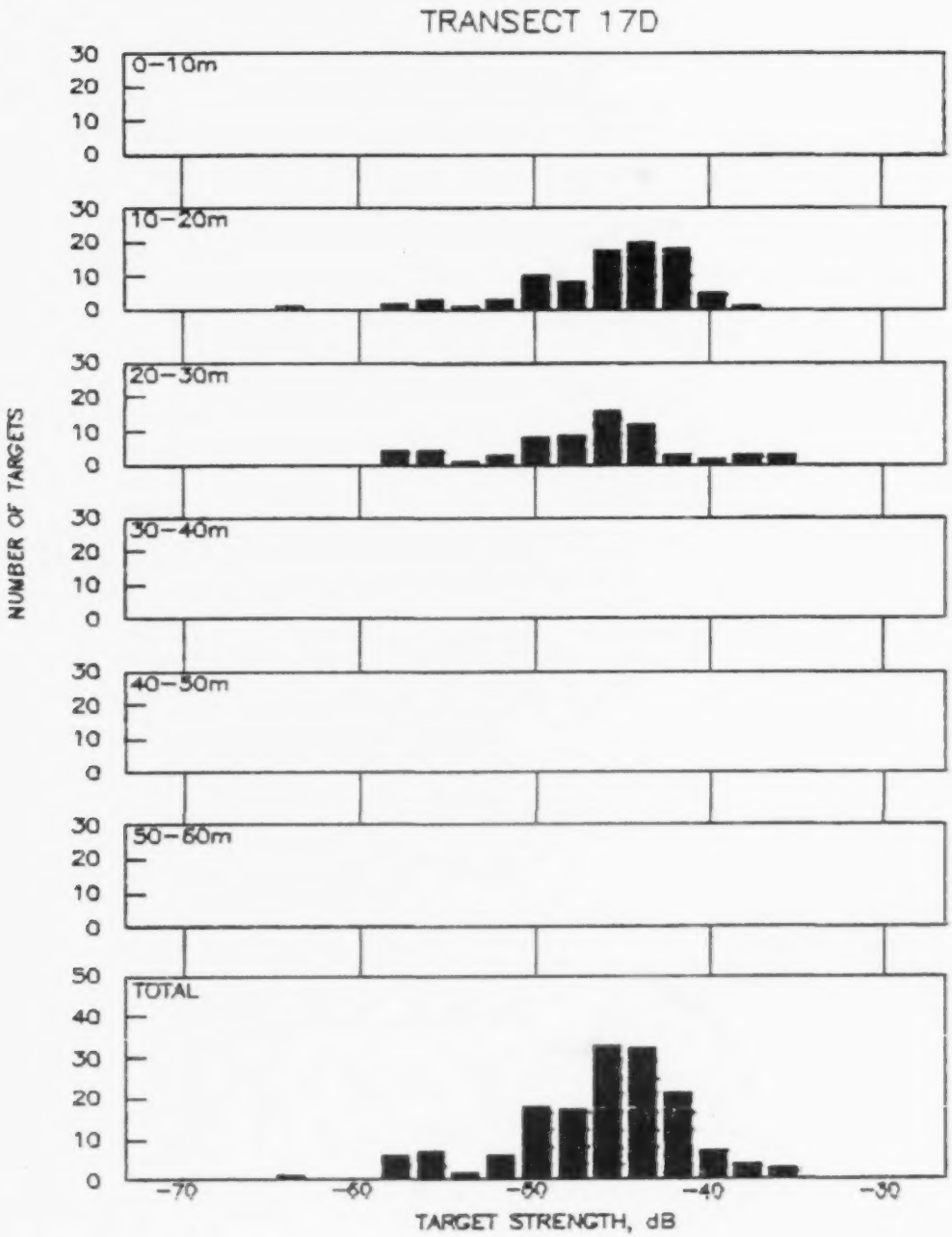

TRANSECT 13
0–10m
10–20m
20–30m
30–40m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

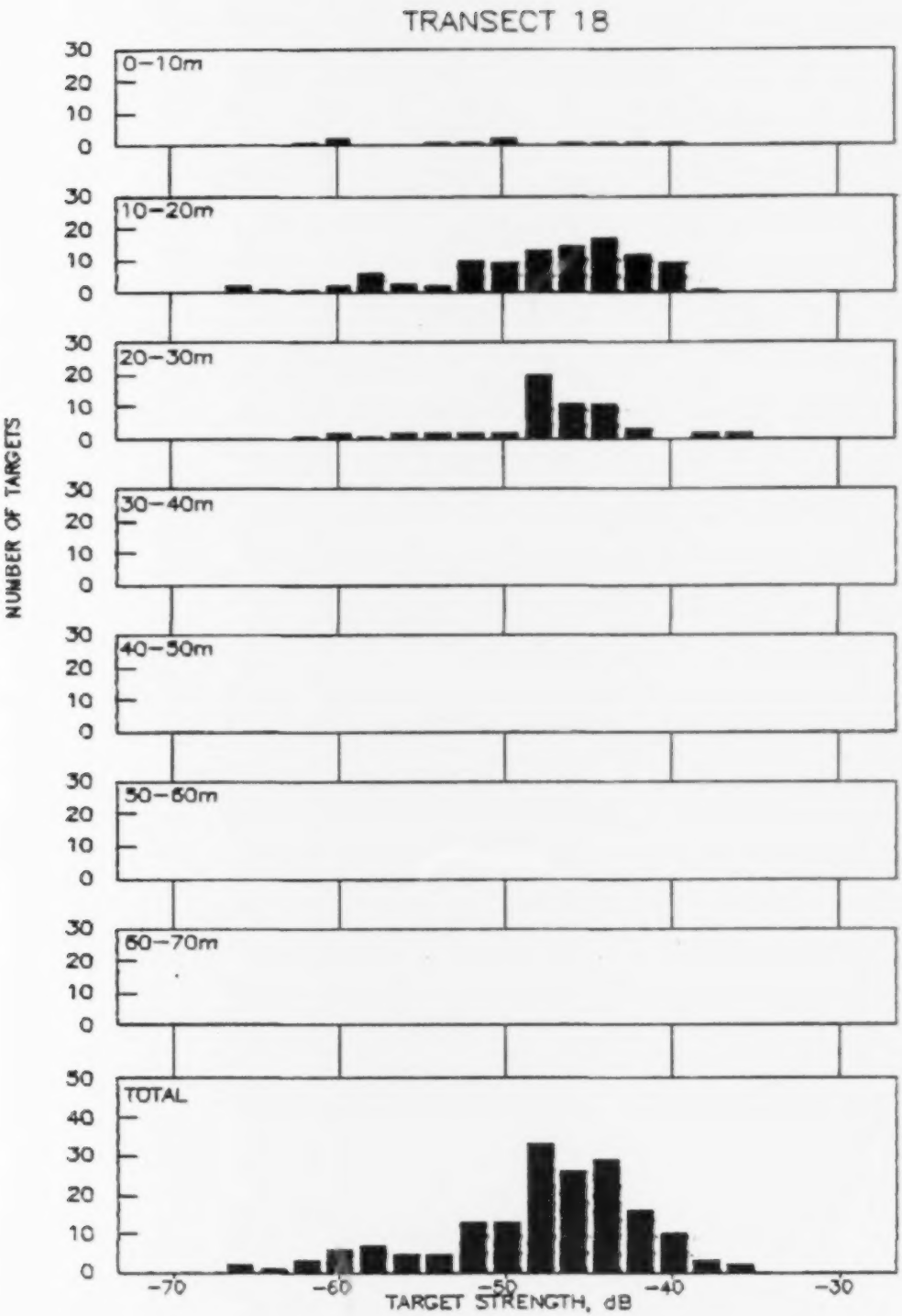

TRANSECT 14
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

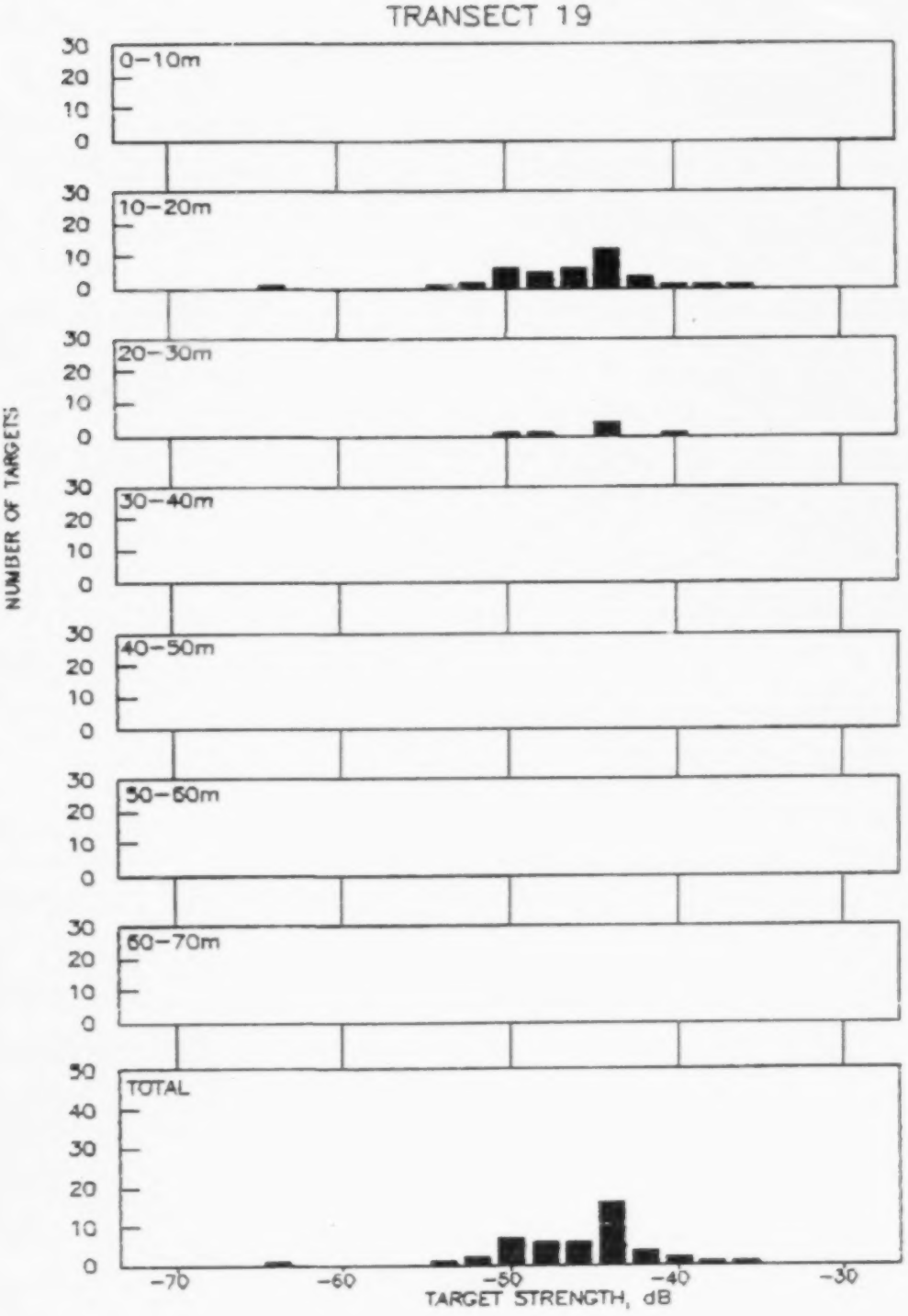

TRANSECT 15
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

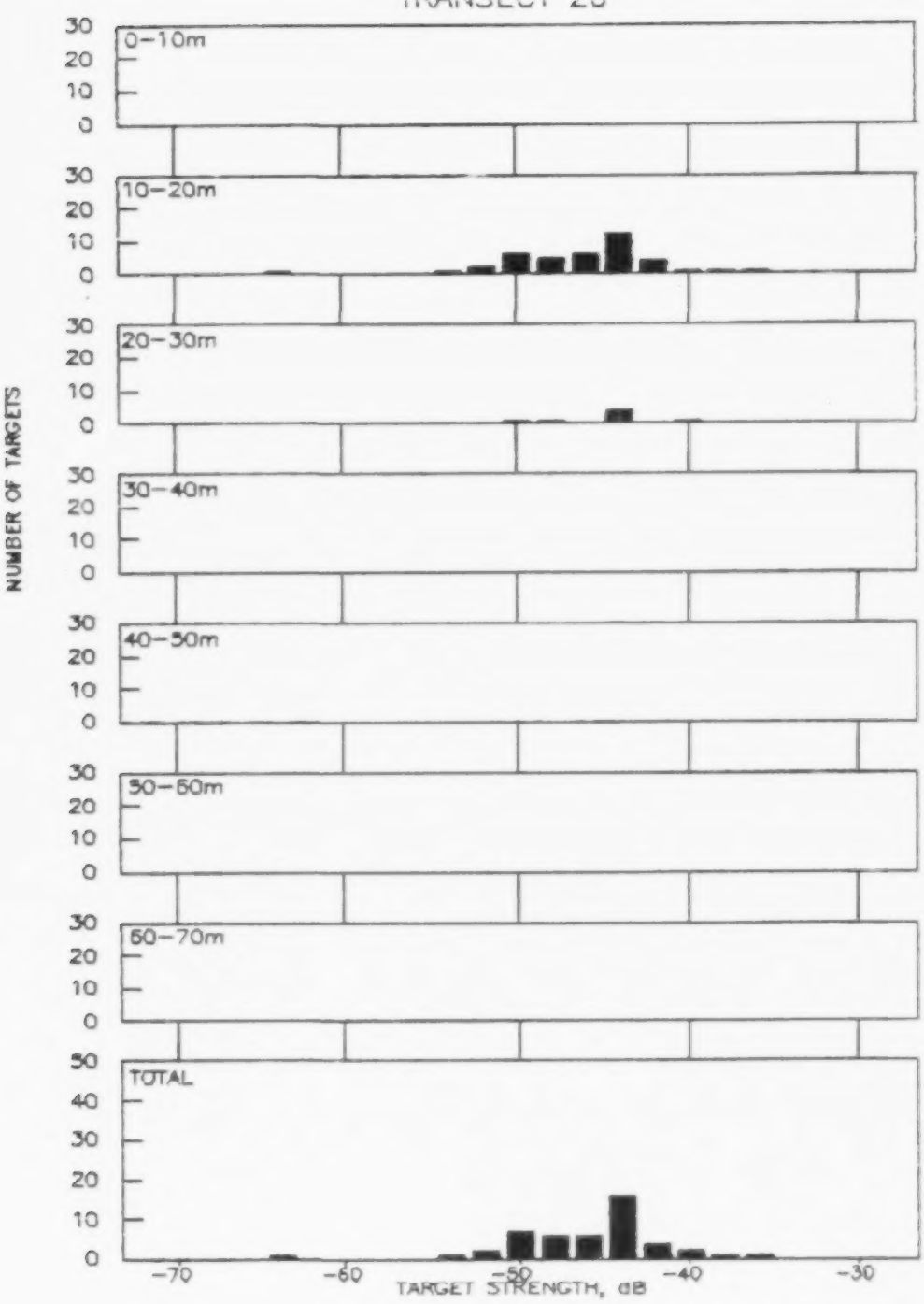

TRANSECT 16
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

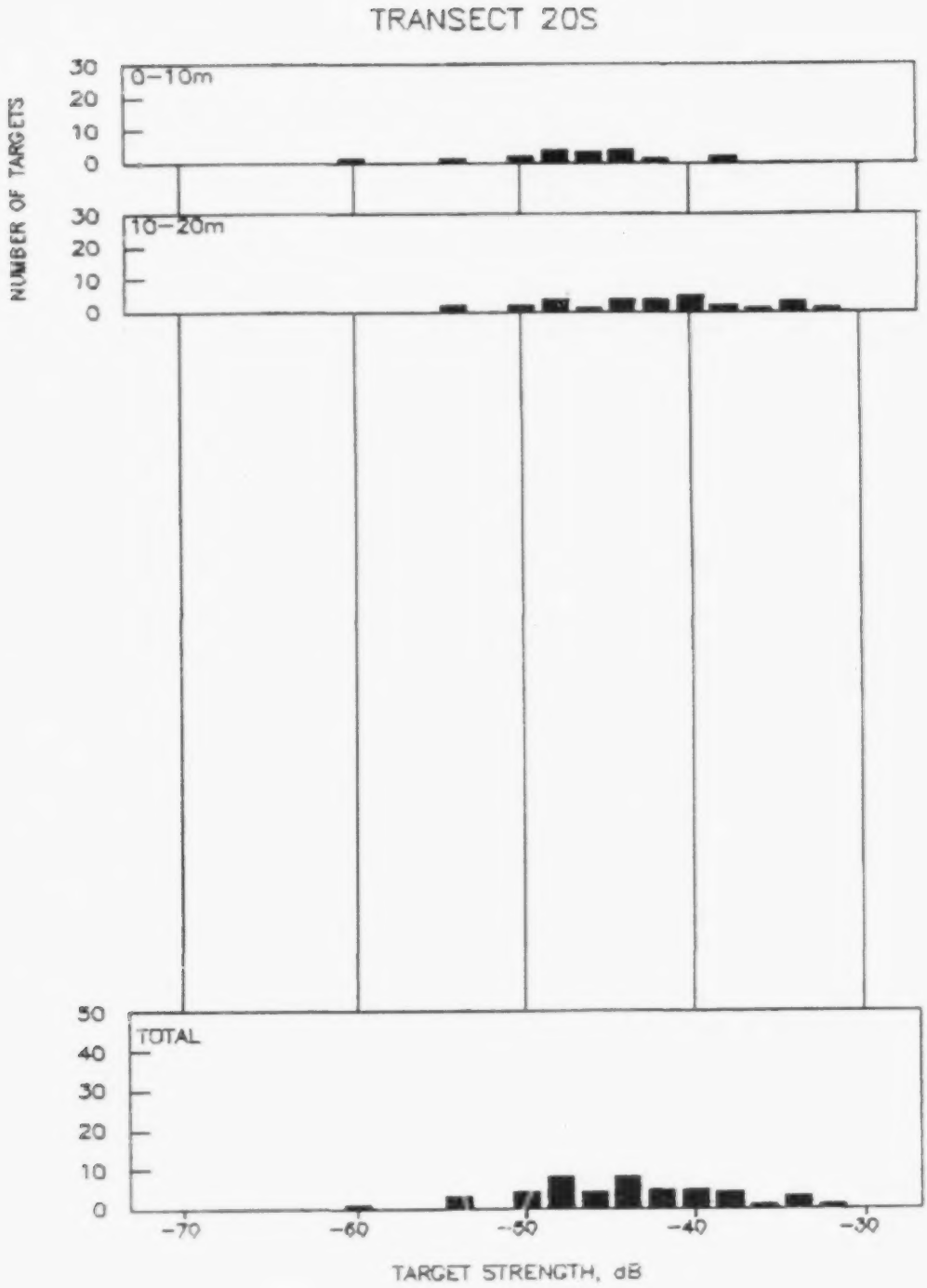

TRANSECT 17S
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

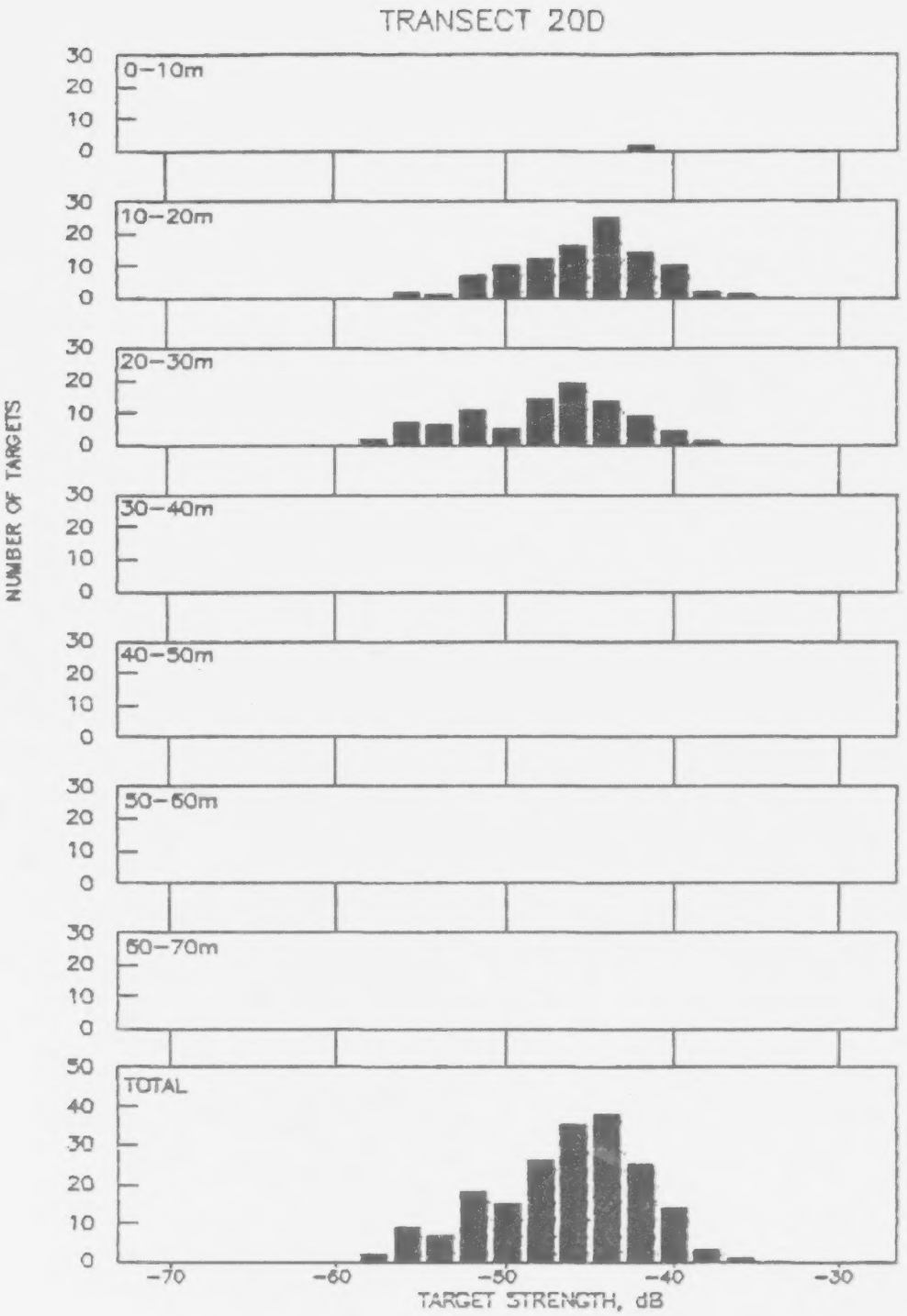

TRANSECT 17D
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

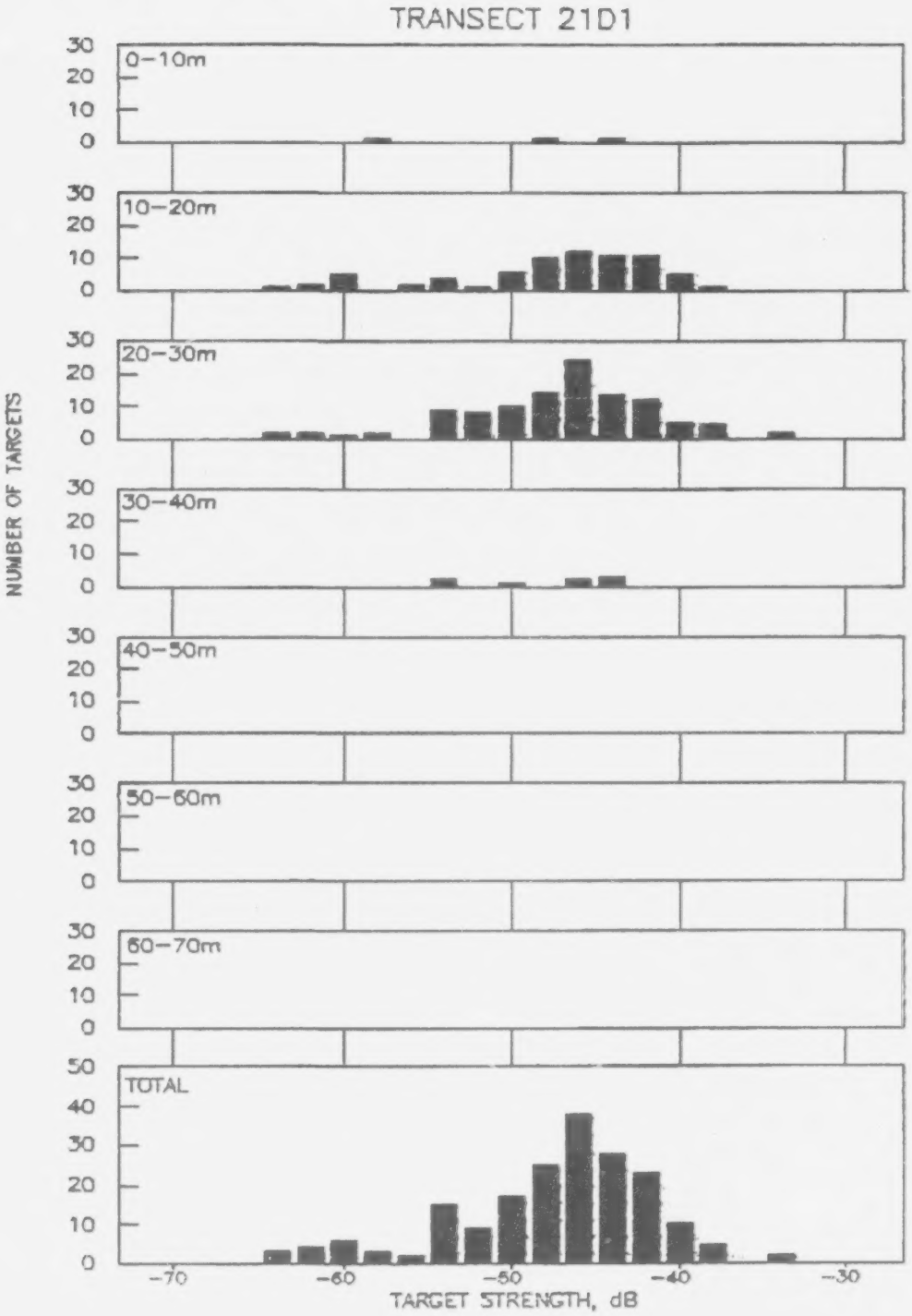

TRANSECT 18
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

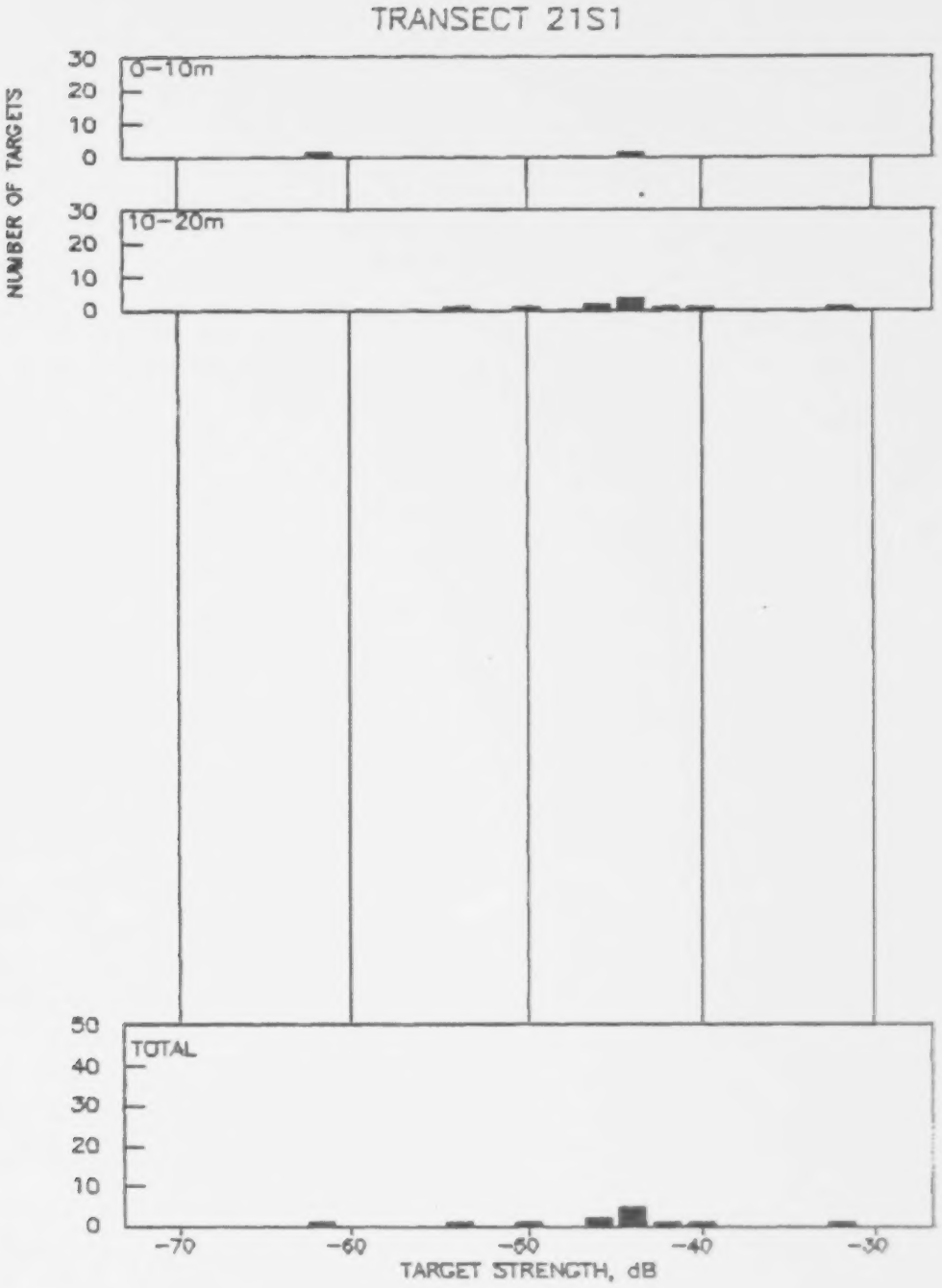

TRANSECT 19
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

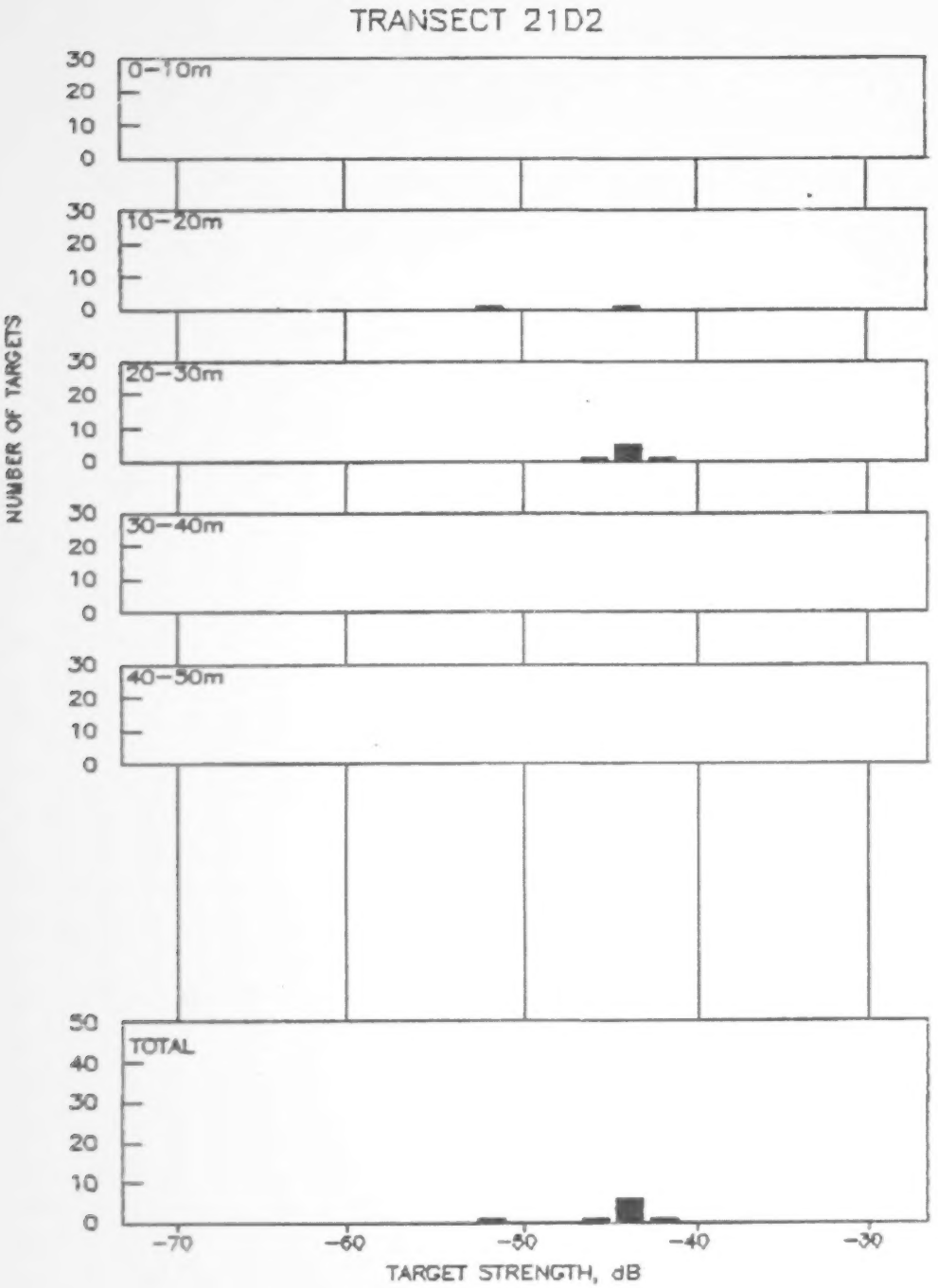

TRANSECT 20
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

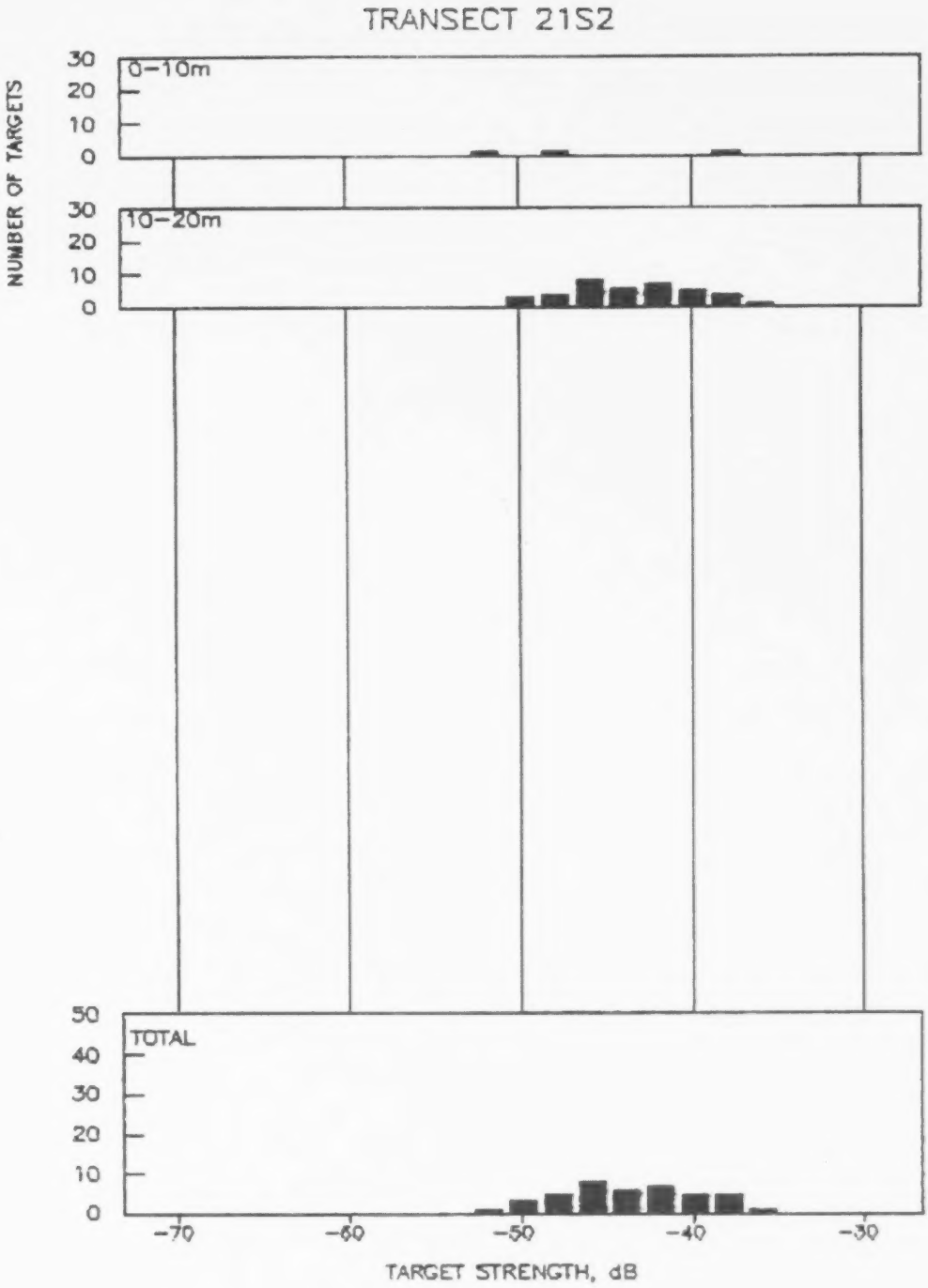

TRANSECT 20S
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

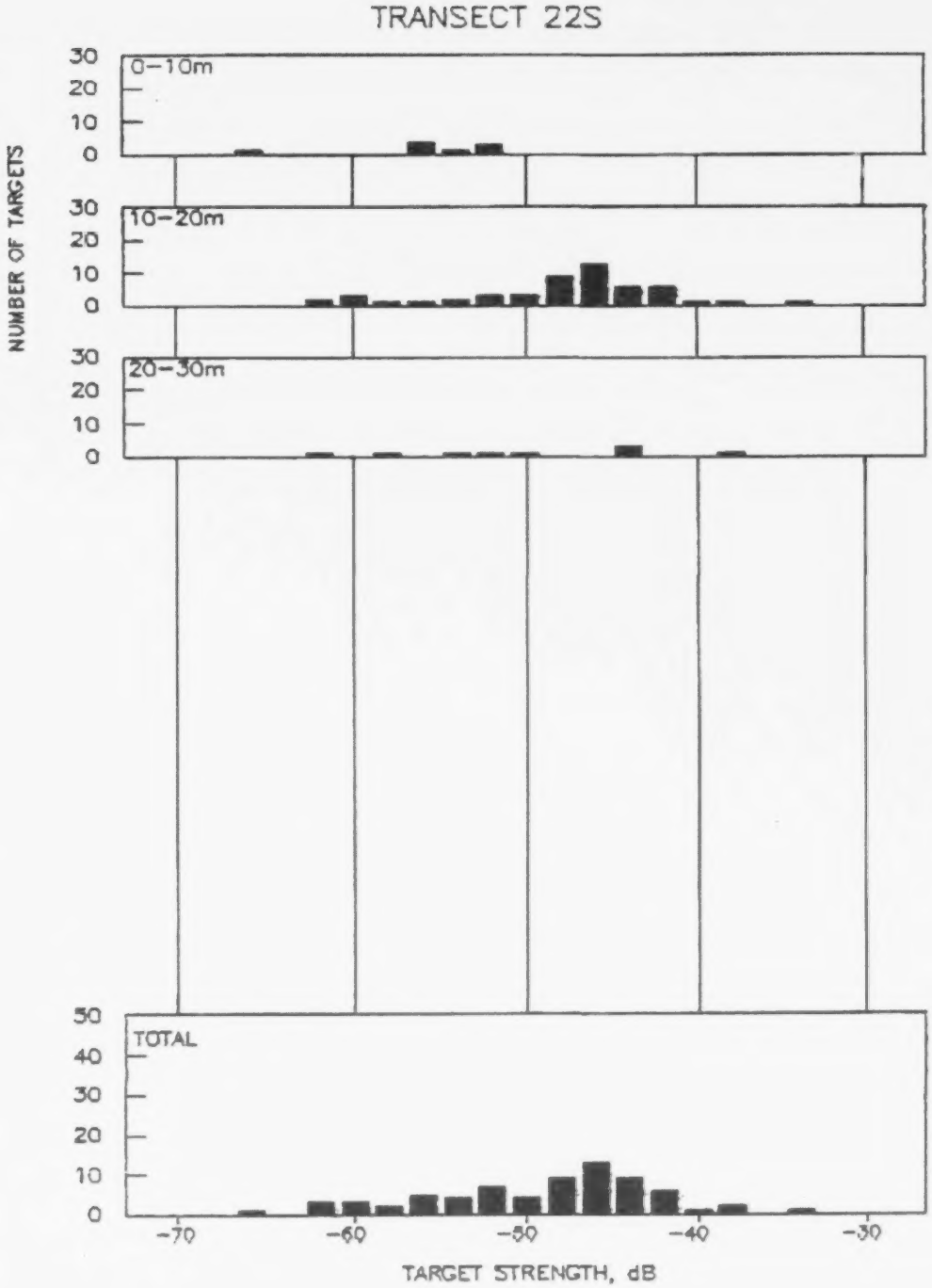

TRANSECT 20D
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

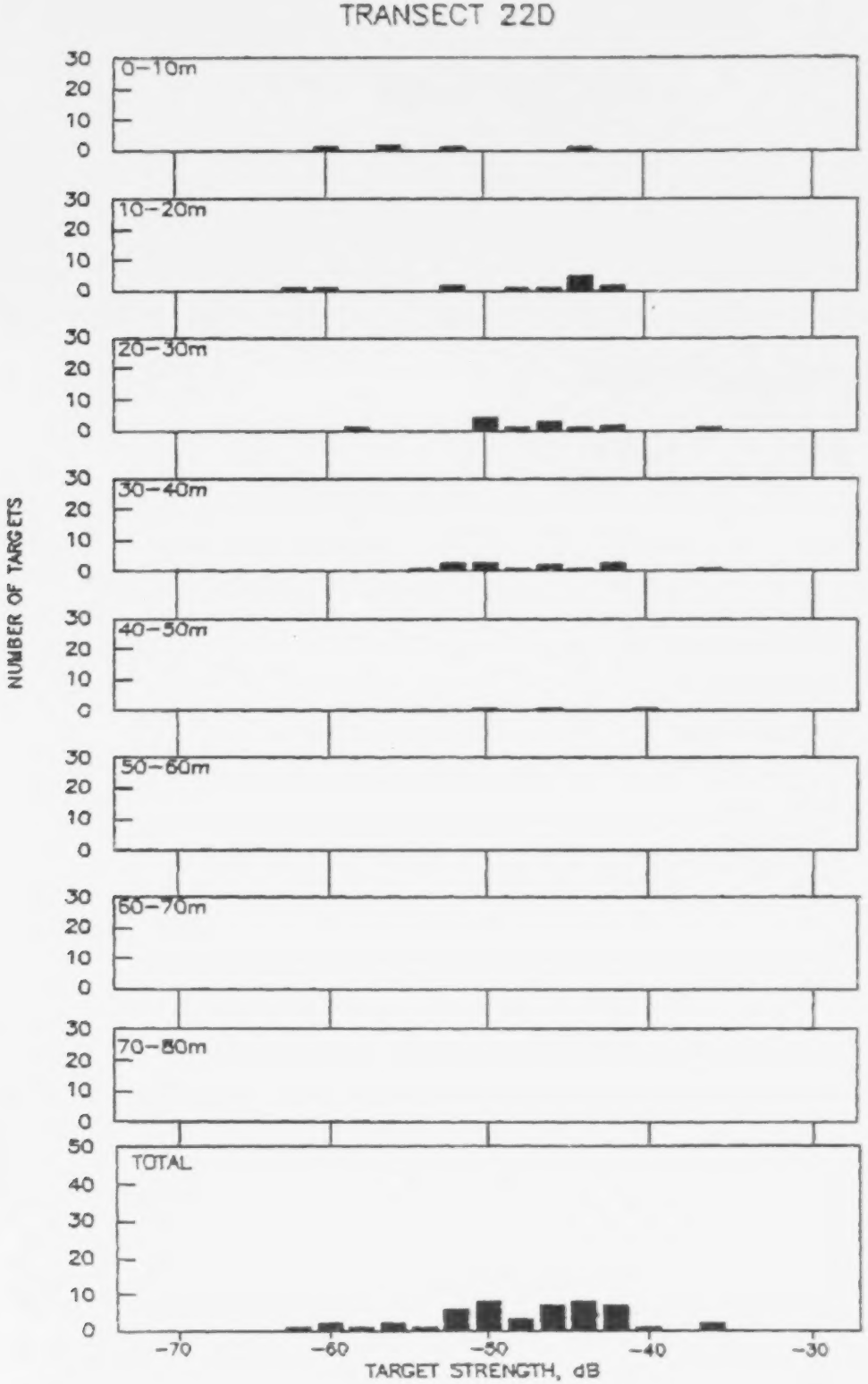

TRANSECT 21D1
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

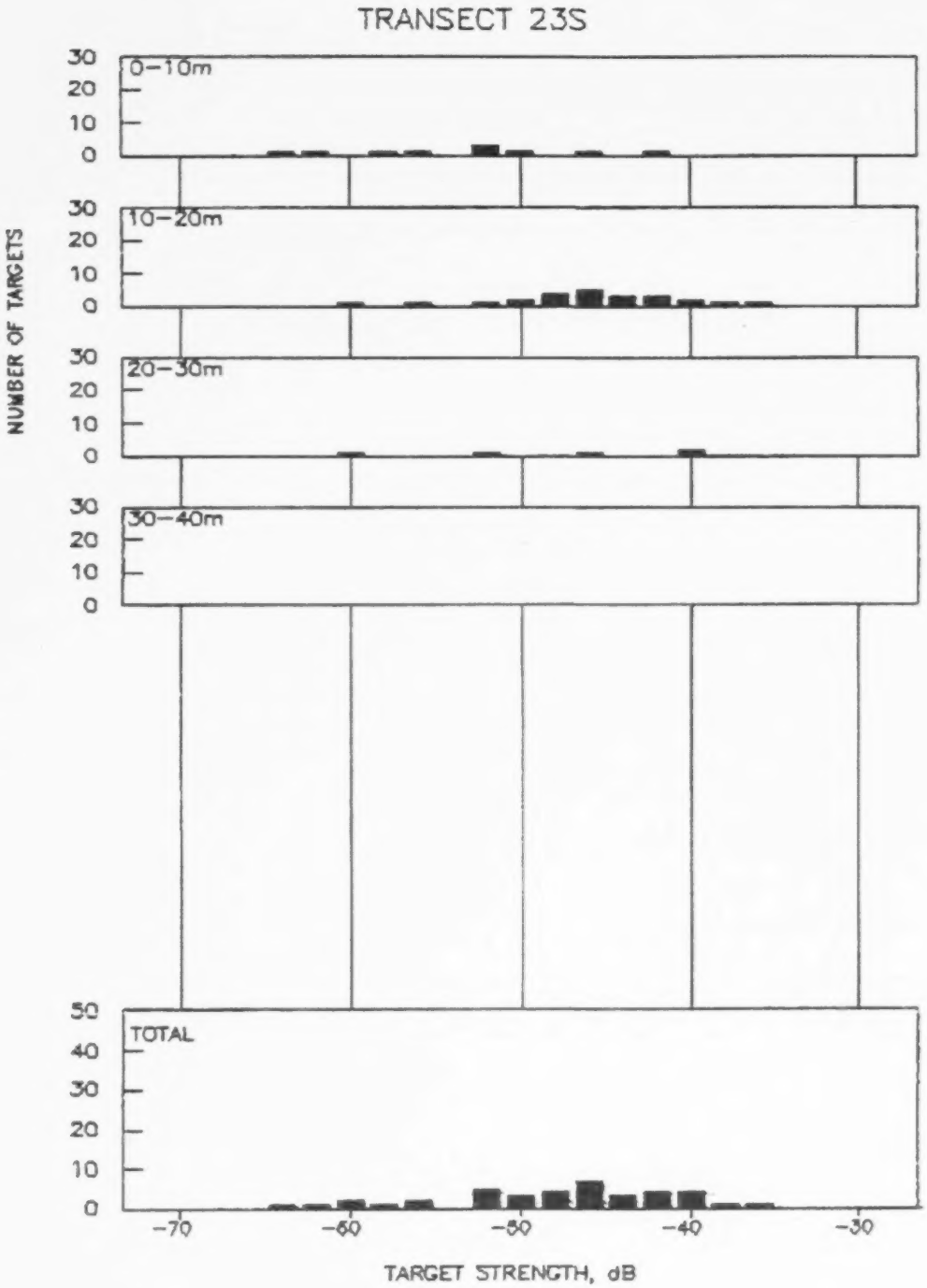

TRANSECT 21S1
0–10m
10–20m
TOTAL
NUMBER OF TARGETS
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

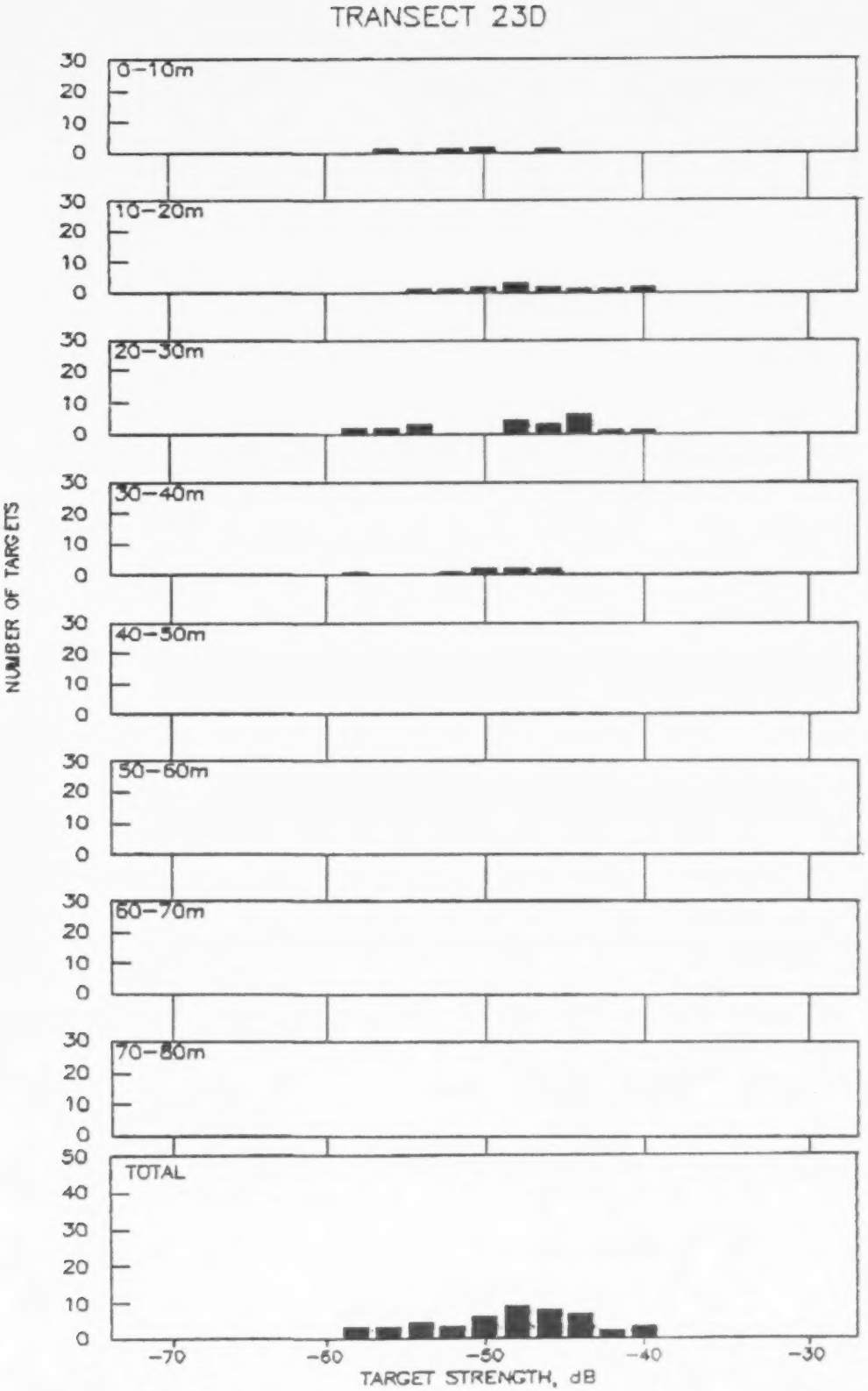

TRANSECT 21D2
0-10m
10-20m
20-30m
30-40m
40-50m
TOTAL
30
20
10
0
50
40
-70
-60
-50
-40
-30
NUMBER OF TARGETS
TARGET STRENGTH, dB

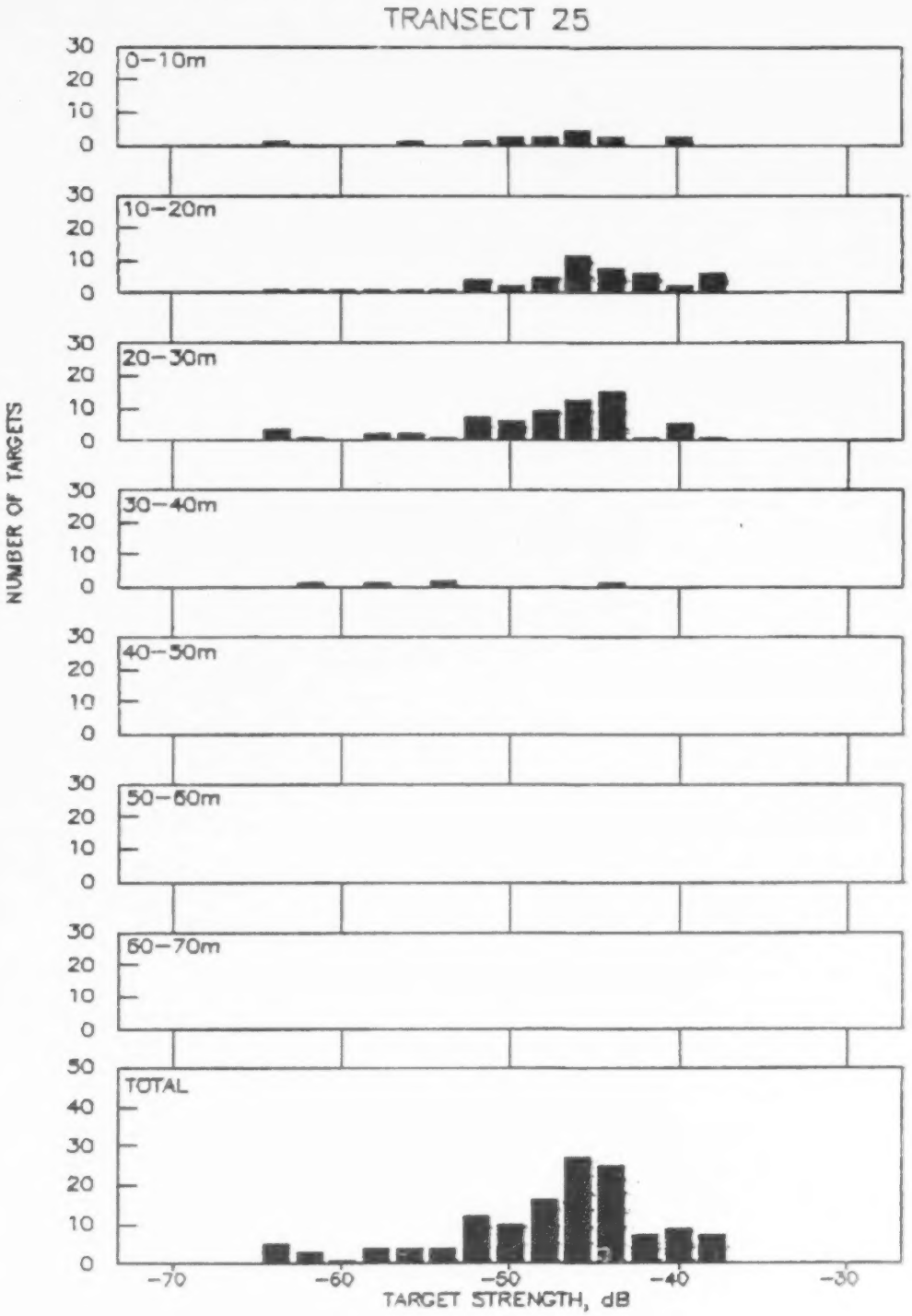

TRANSECT 21S2
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

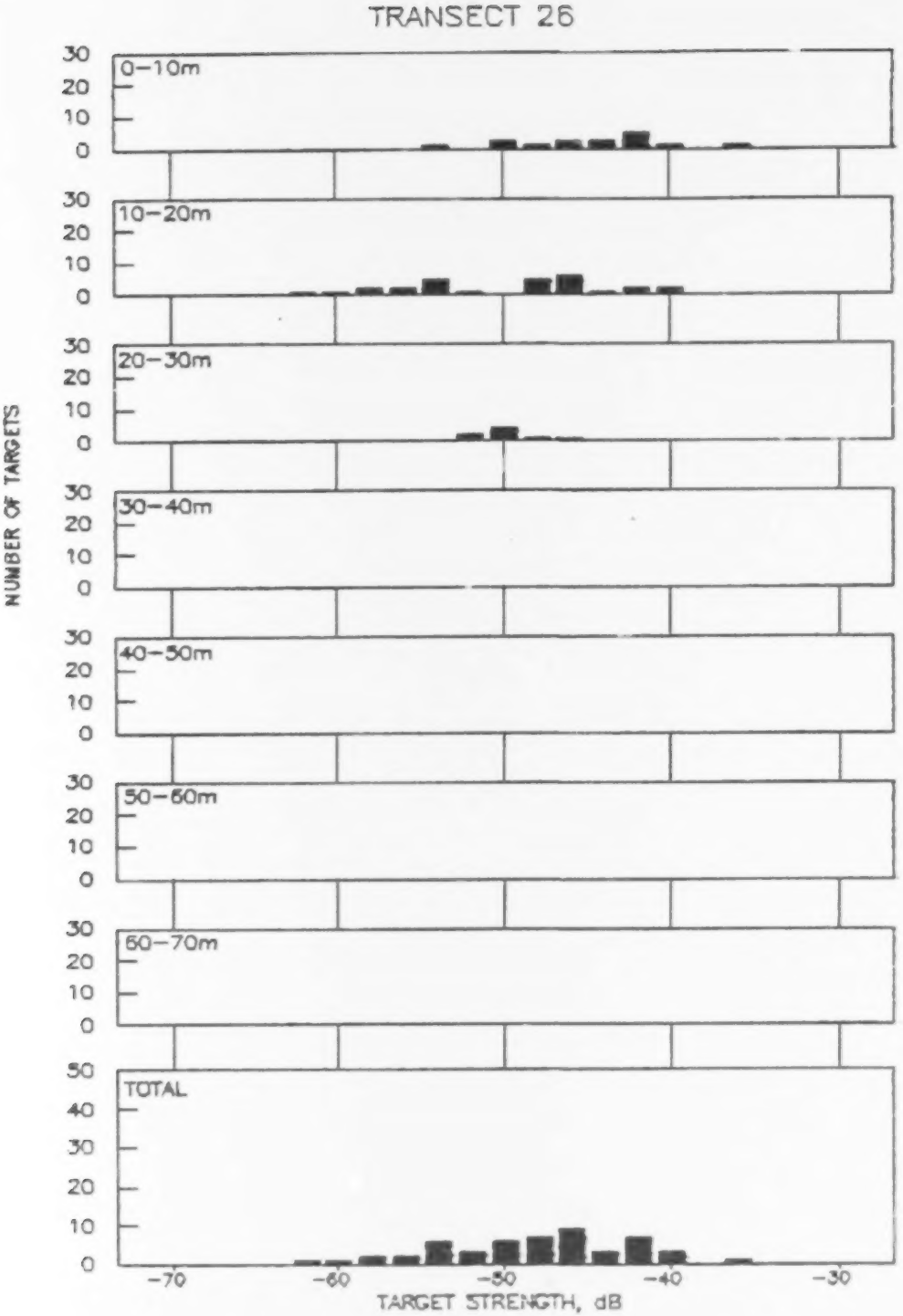

TRANSECT 22S
NUMBER OF TARGETS
0–10m
10–20m
20–30m
TOTAL
30
20
10
0
50
40
30
20
10
0
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

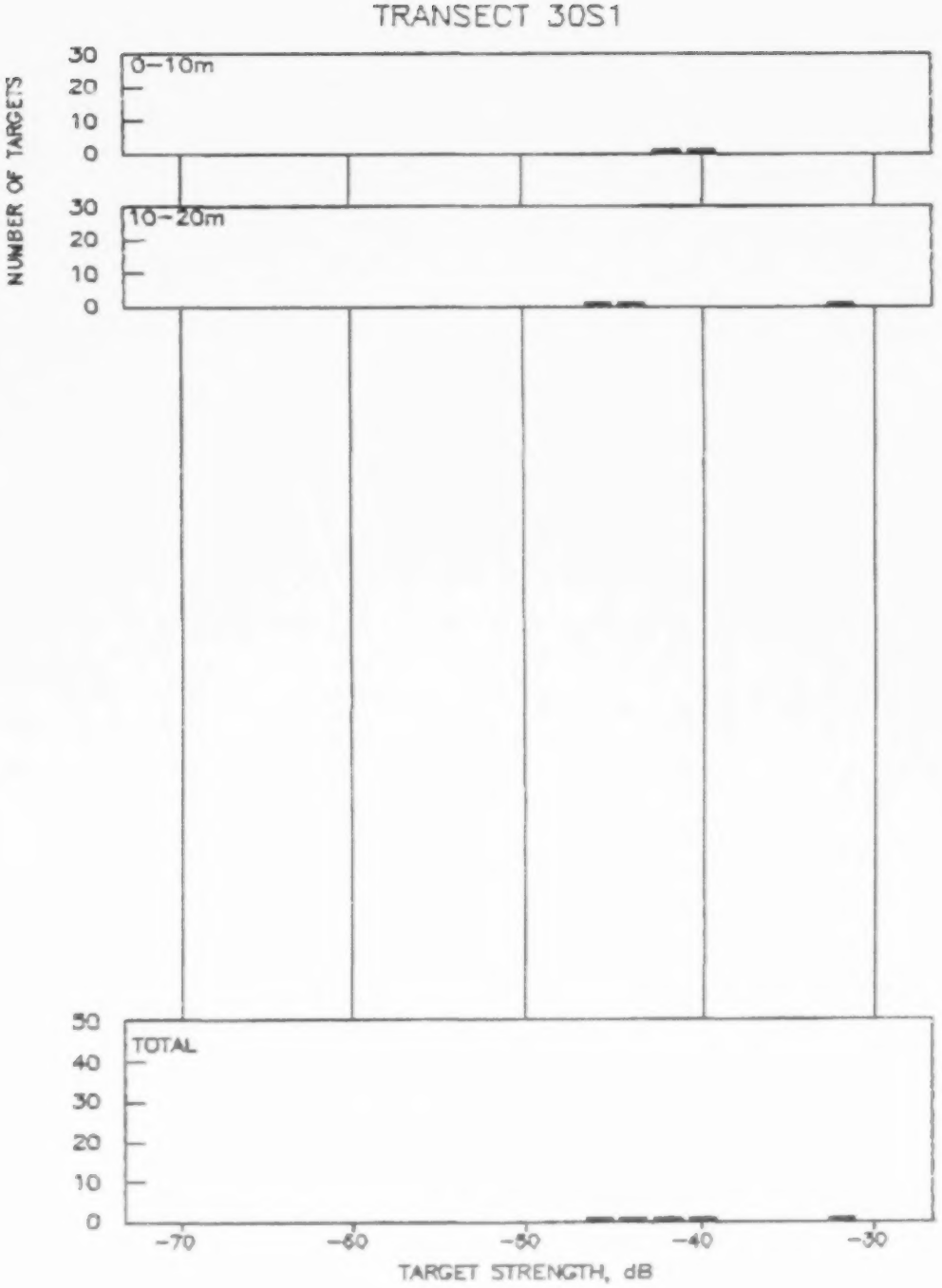

TRANSECT 22D
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

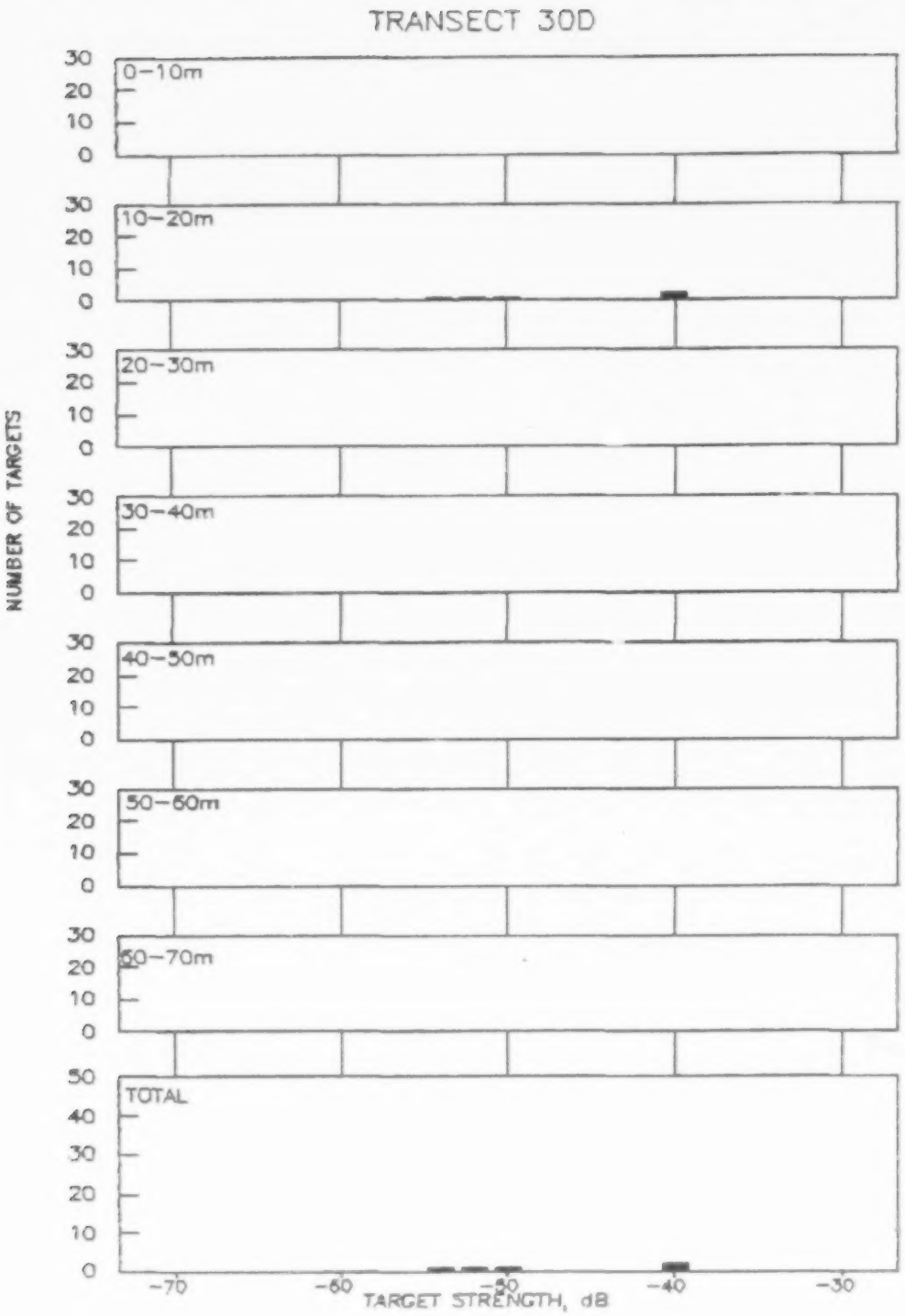

TRANSECT 23S
0–10m
10–20m
20–30m
30–40m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

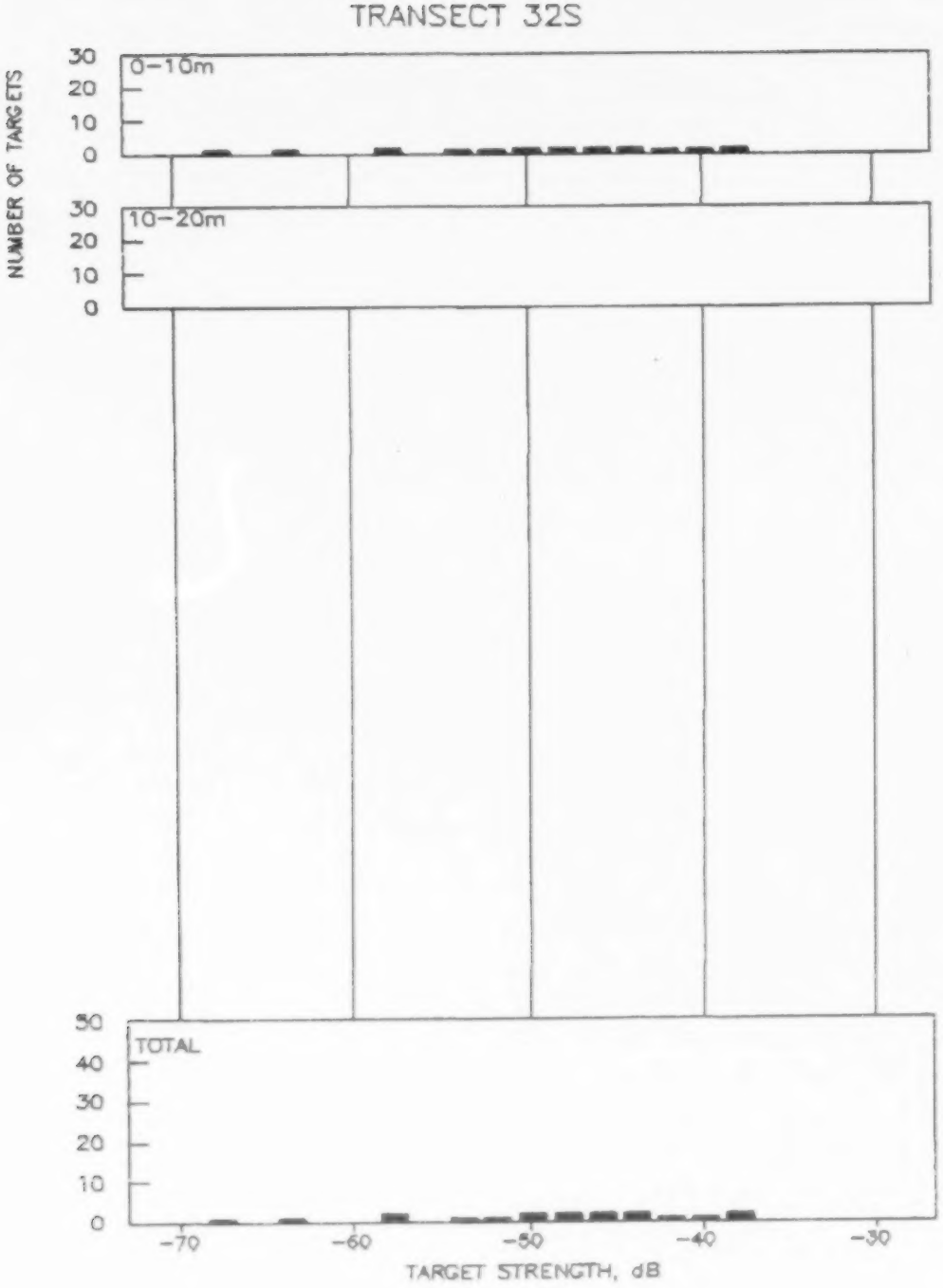

TRANSECT 23D
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

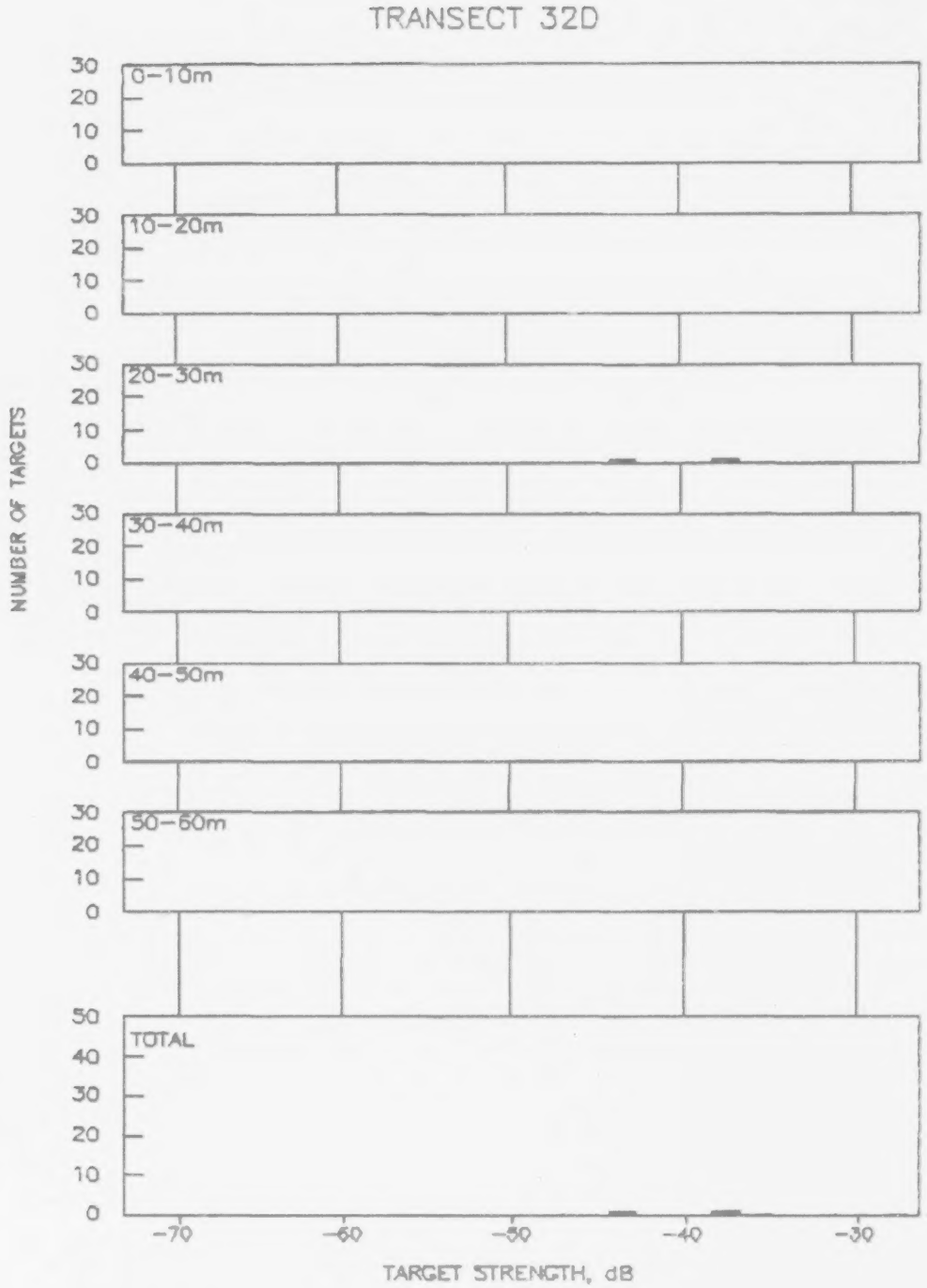

TRANSECT 25
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

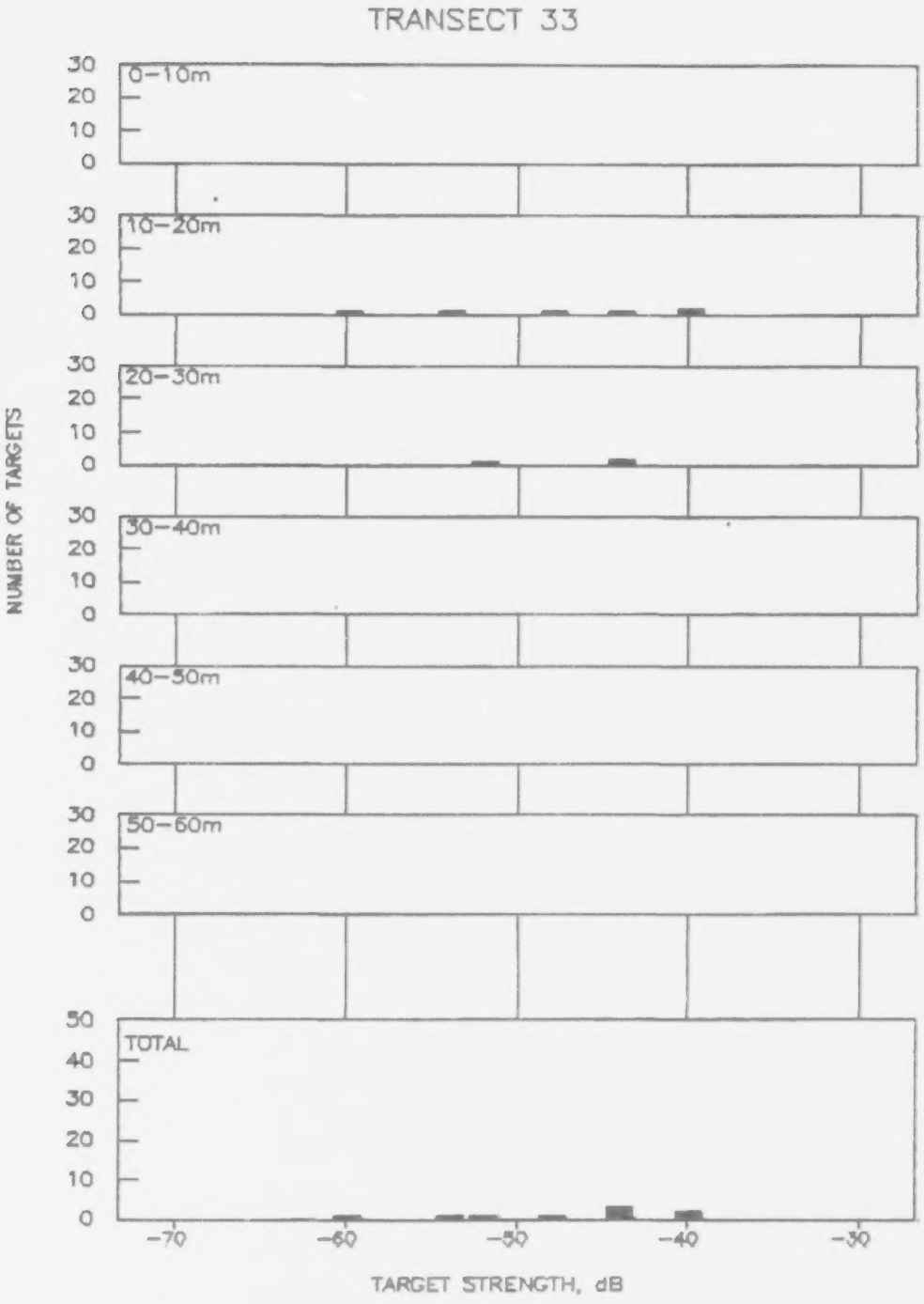

TRANSECT 26
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
50
40
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

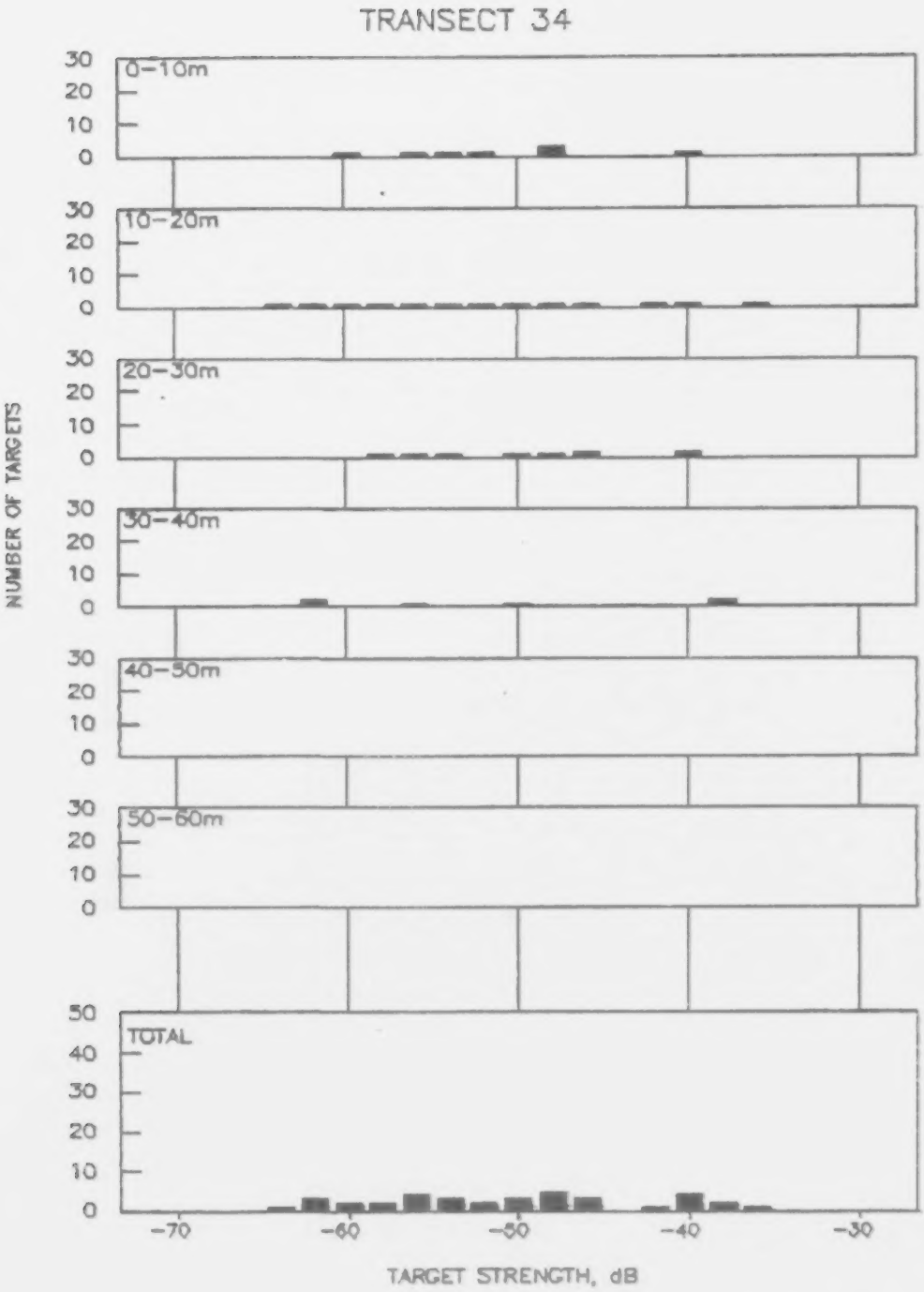

TRANSECT 30S1
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
30
20
10
0
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

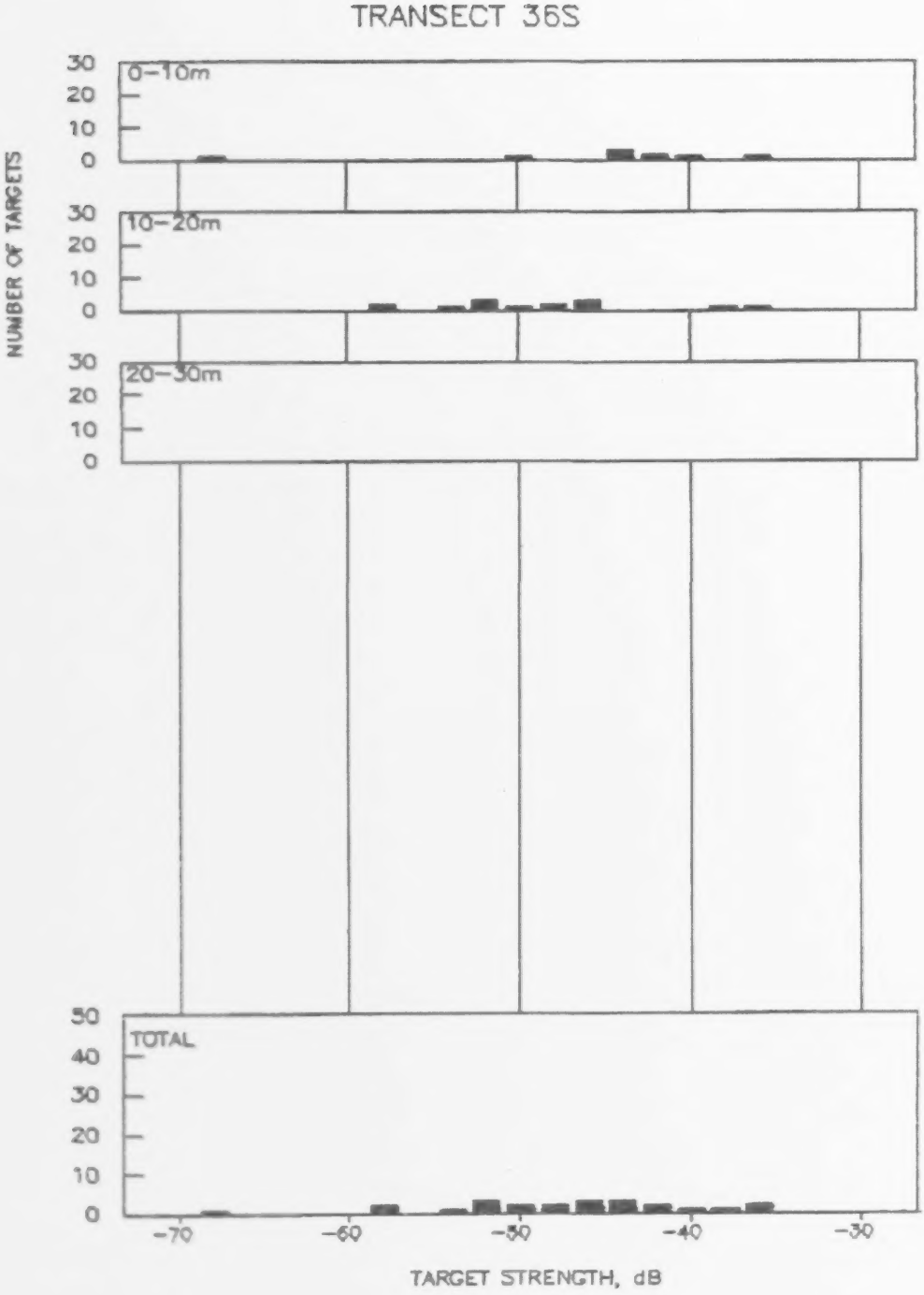

TRANSECT 30D
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

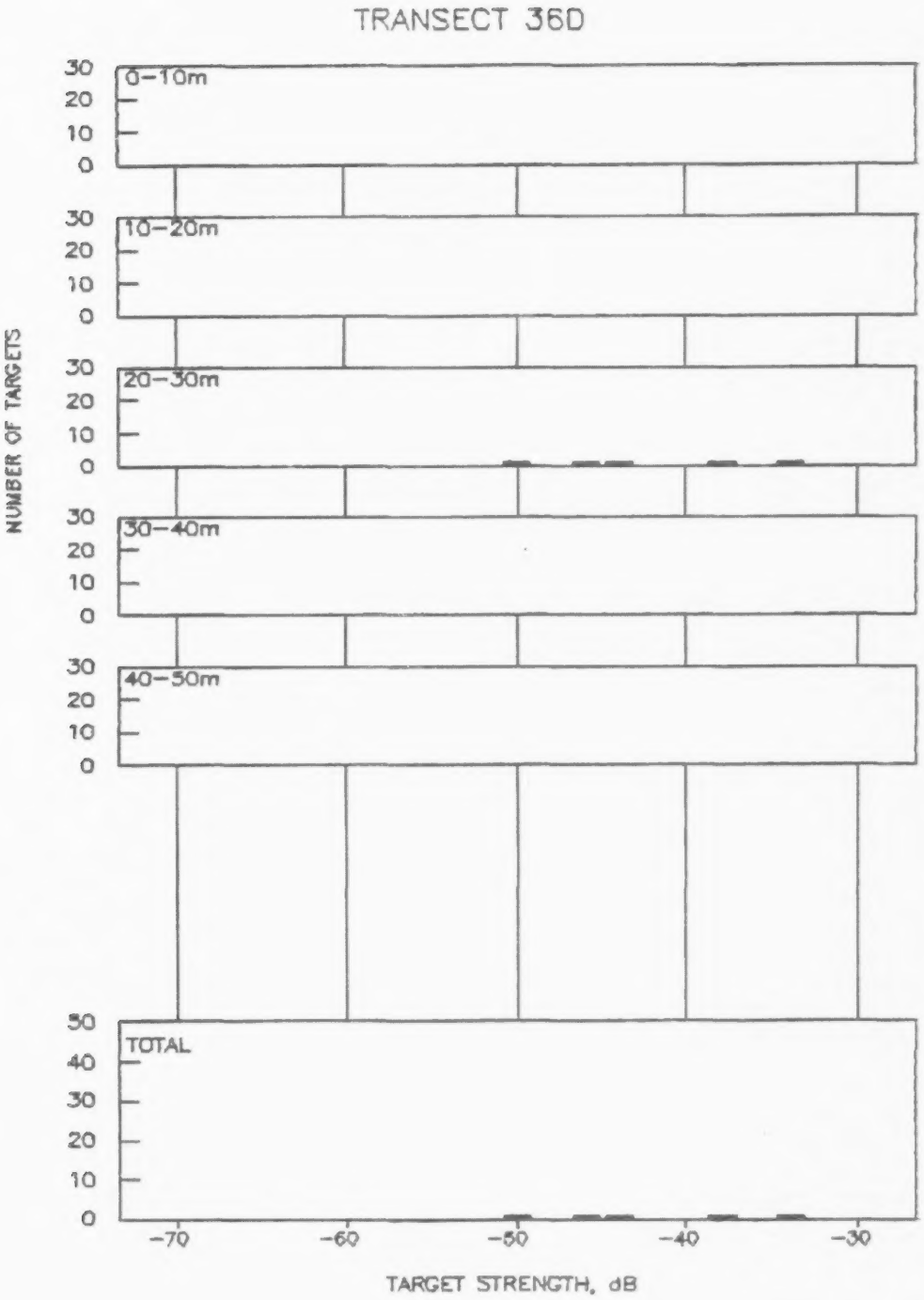

TRANSECT 32S
NUMBER OF TARGETS
0-10m
10-20m
TOTAL
30
20
10
0
50
40
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

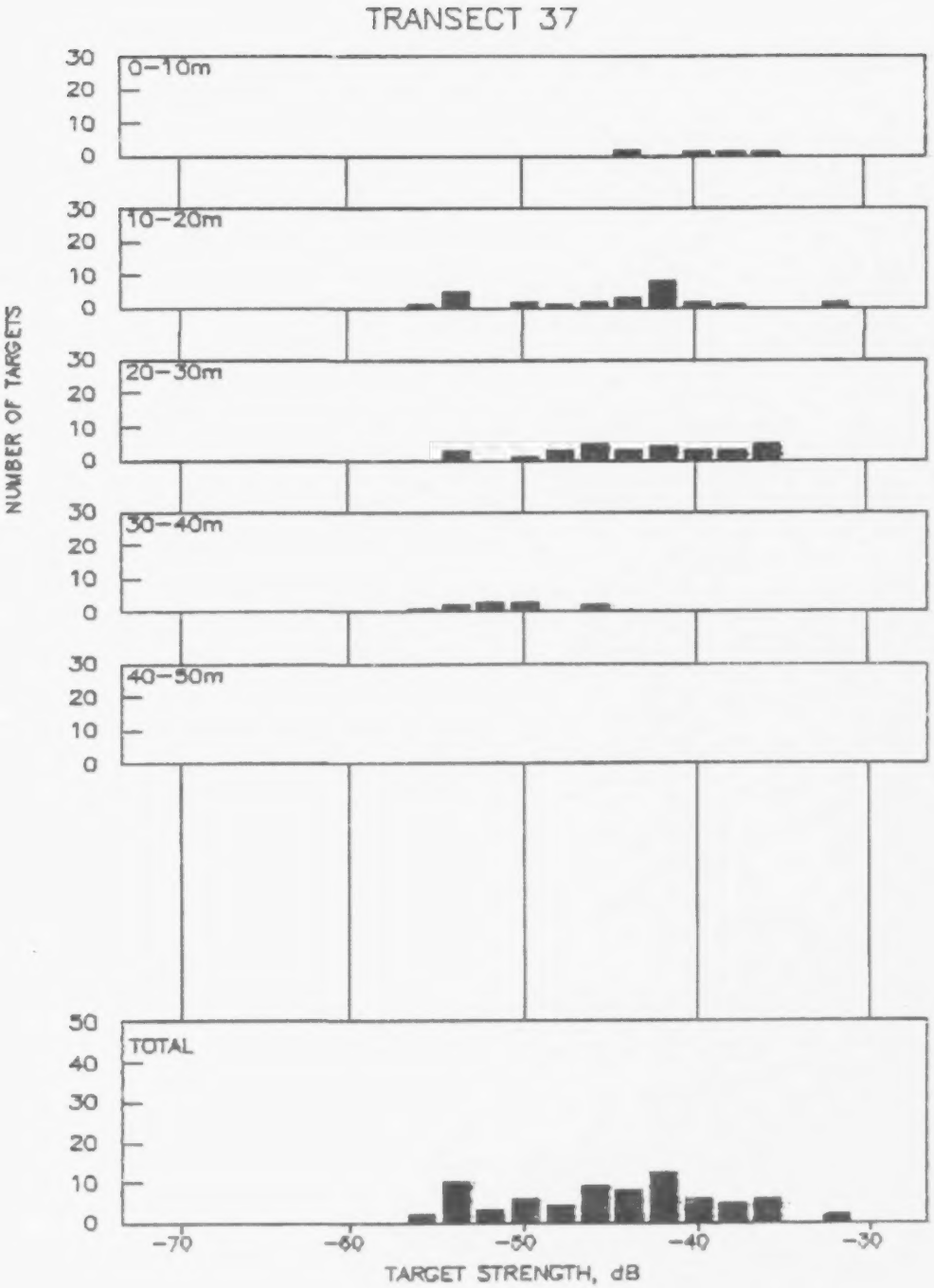

TRANSECT 32D
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

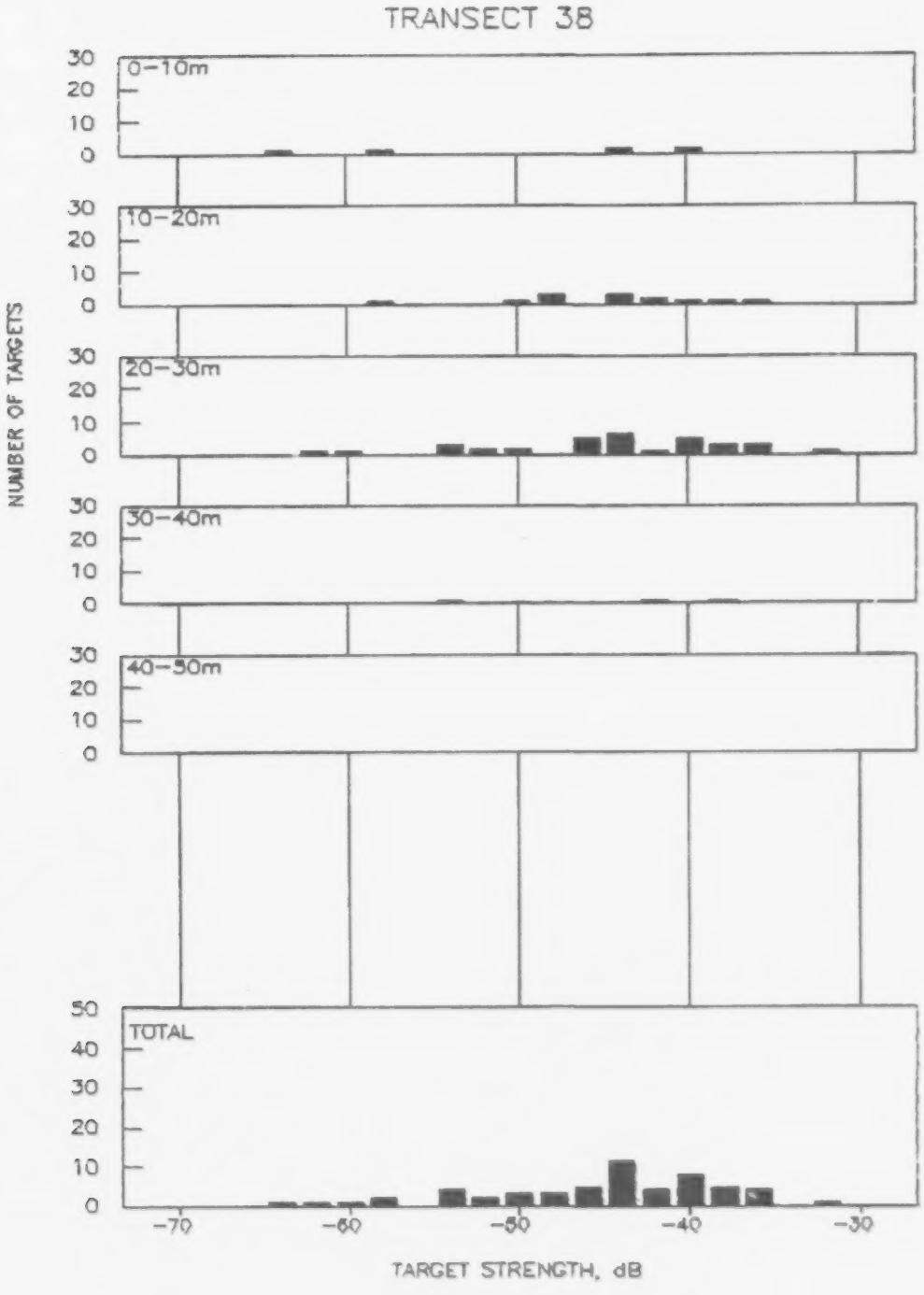

TRANSECT 33
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

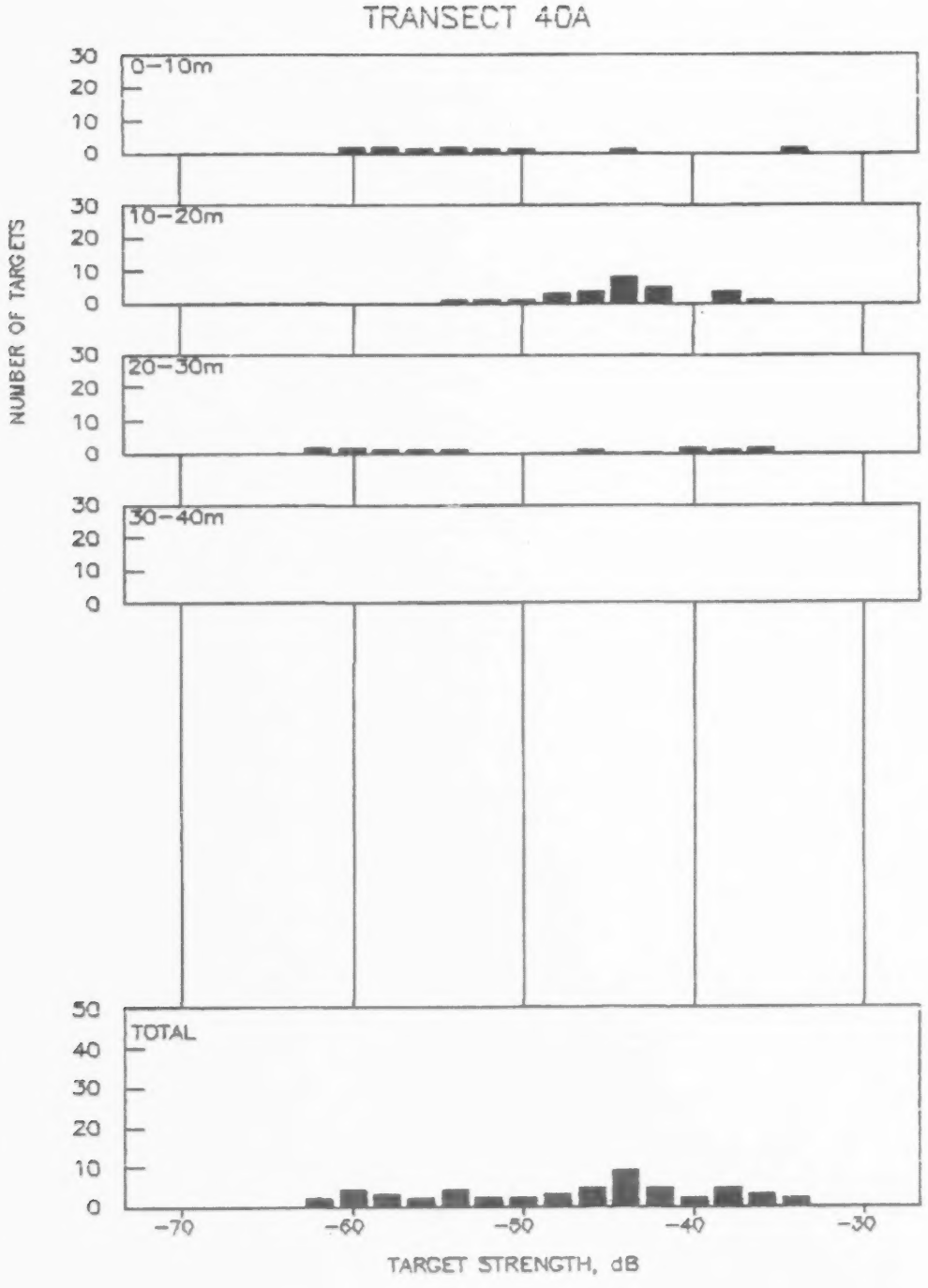

TRANSECT 34
0-10m
10-20m
20-30m
30-40m
40-50m
50-60m
TOTAL
30
20
10
0
50
40
-70
-60
-50
-40
-30
NUMBER OF TARGETS
TARGET STRENGTH, dB

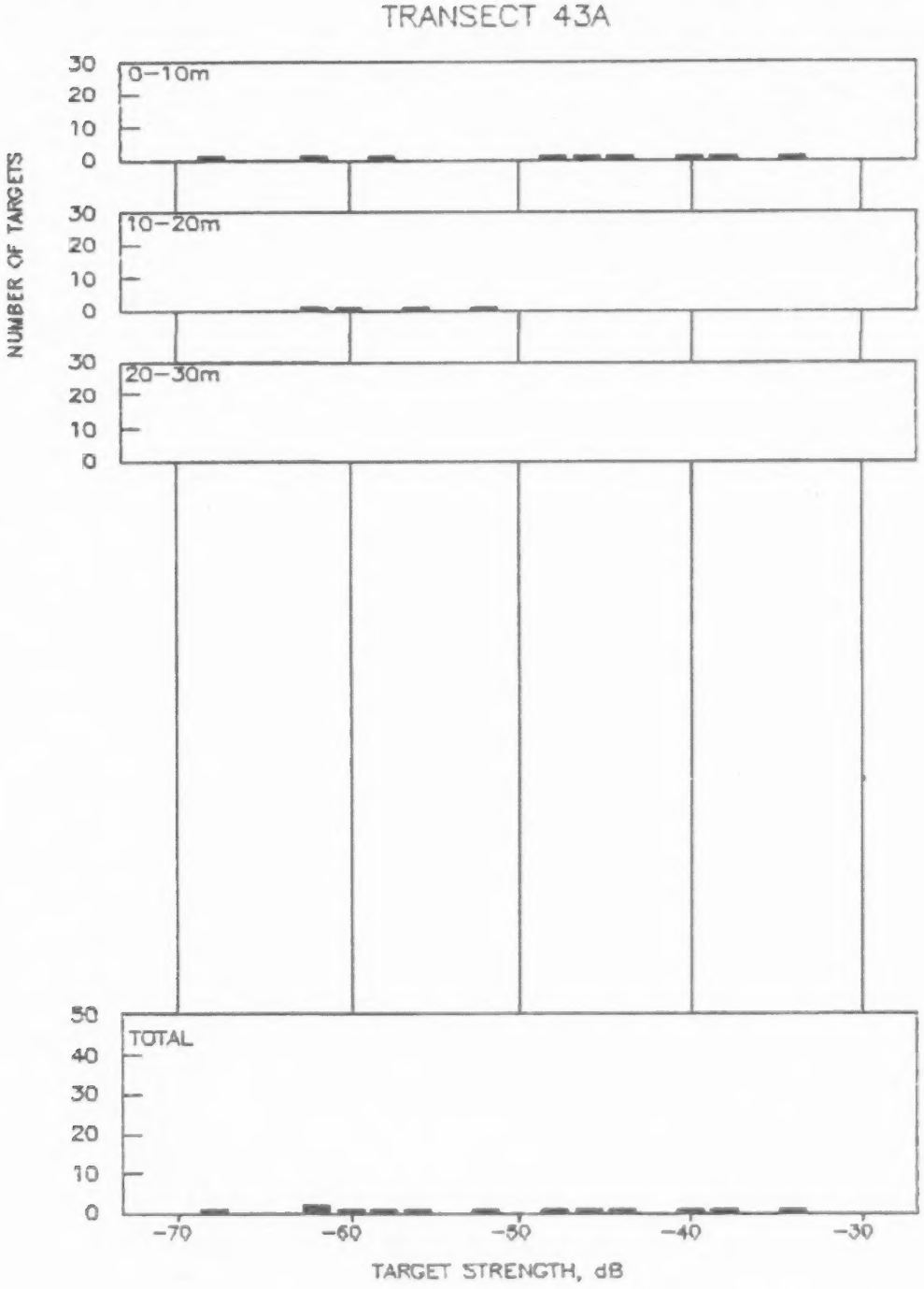

TRANSECT 36S
0–10m
10–20m
20–30m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

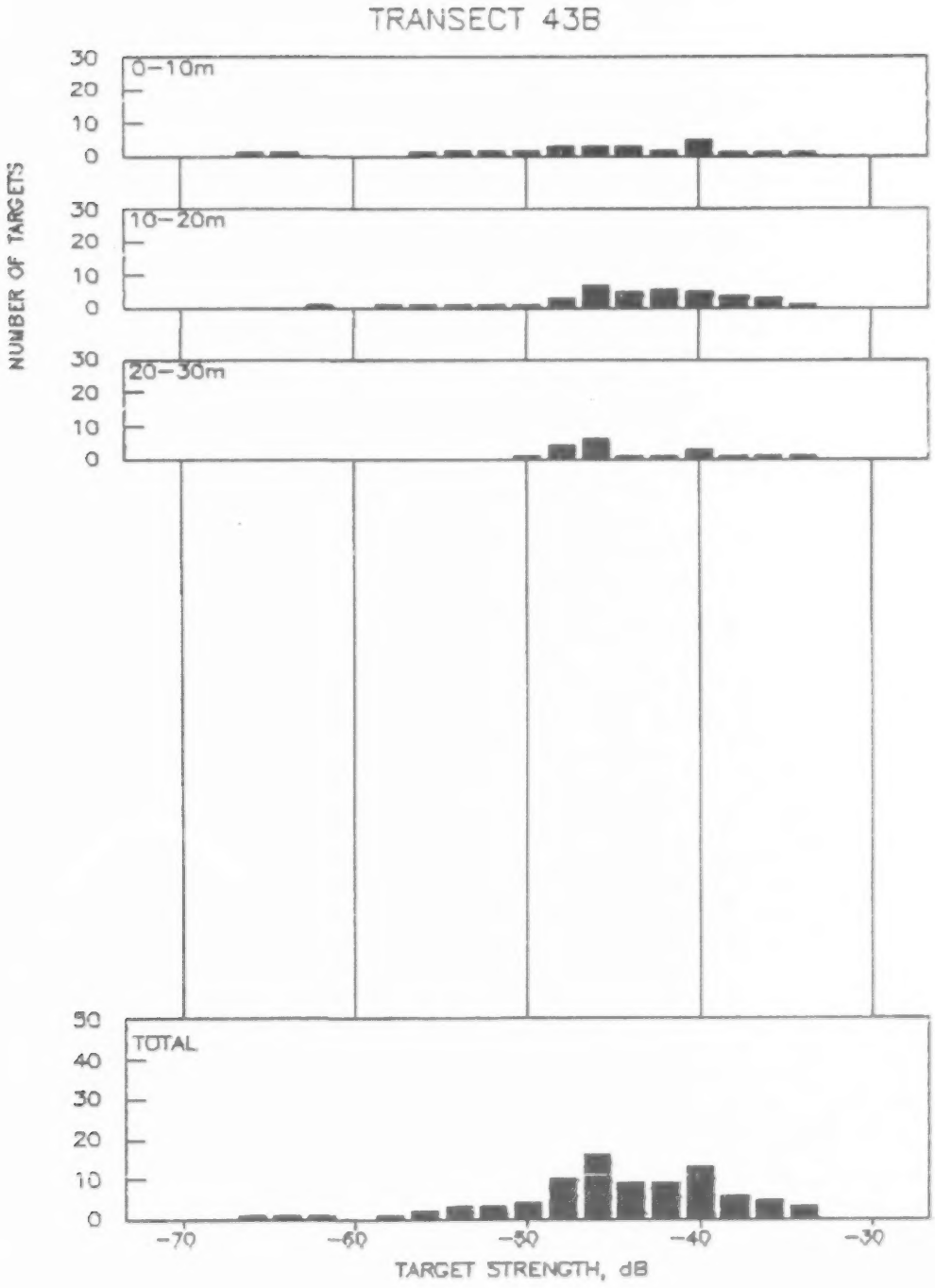

TRANSECT 36D
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

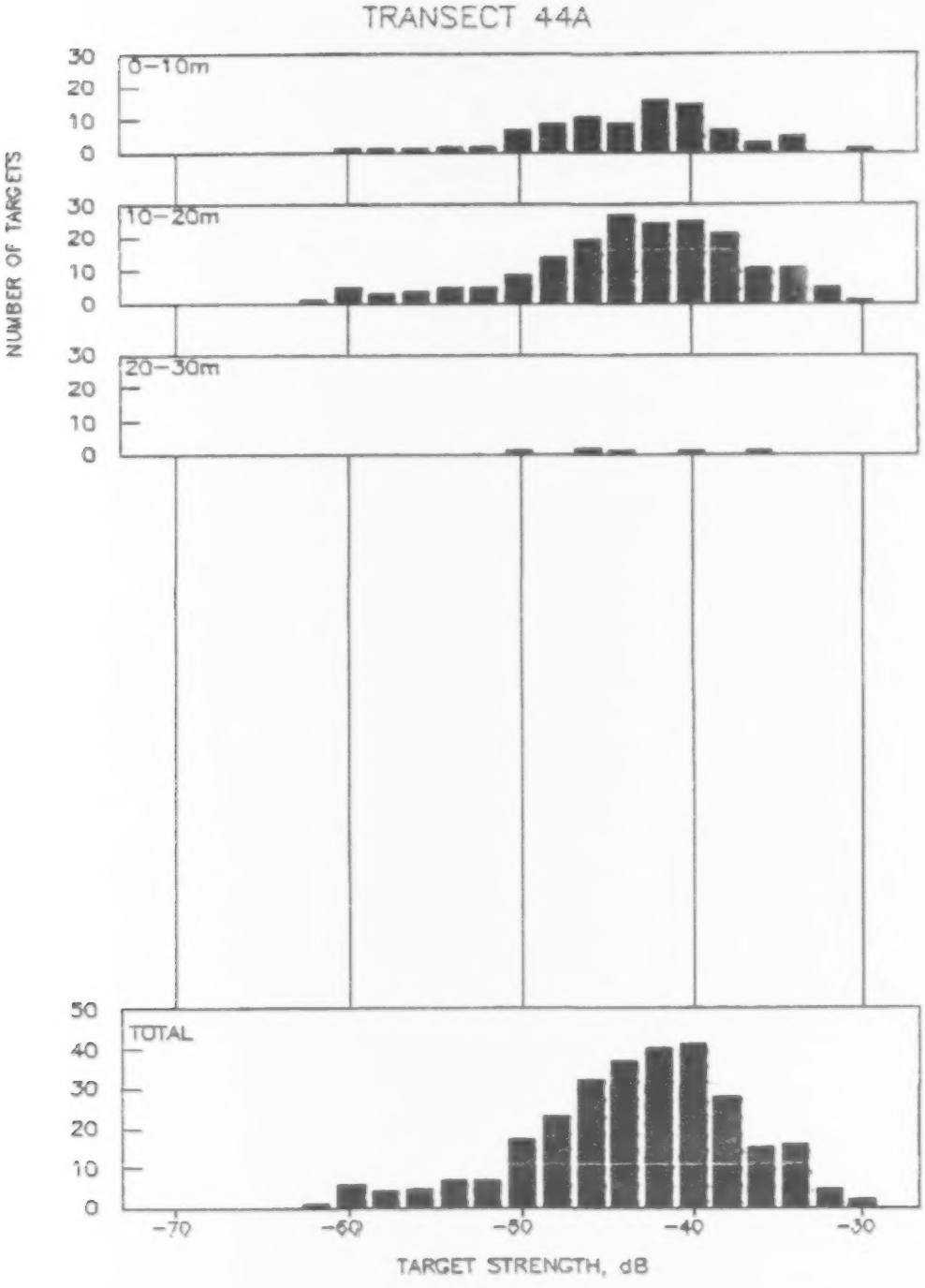

TRANSECT 37
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

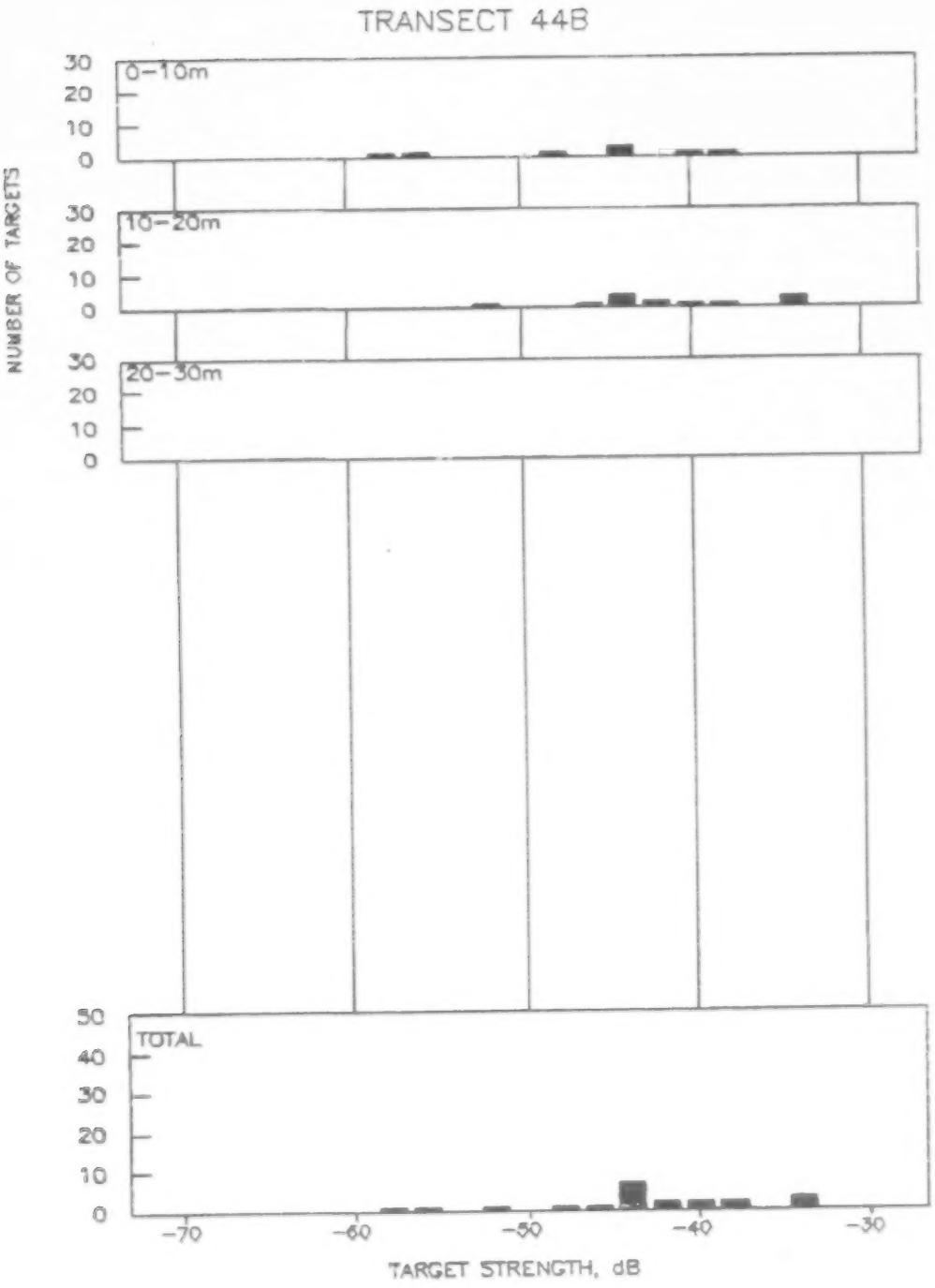

TRANSECT 38
0–10m
10–20m
20–30m
30–40m
40–50m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

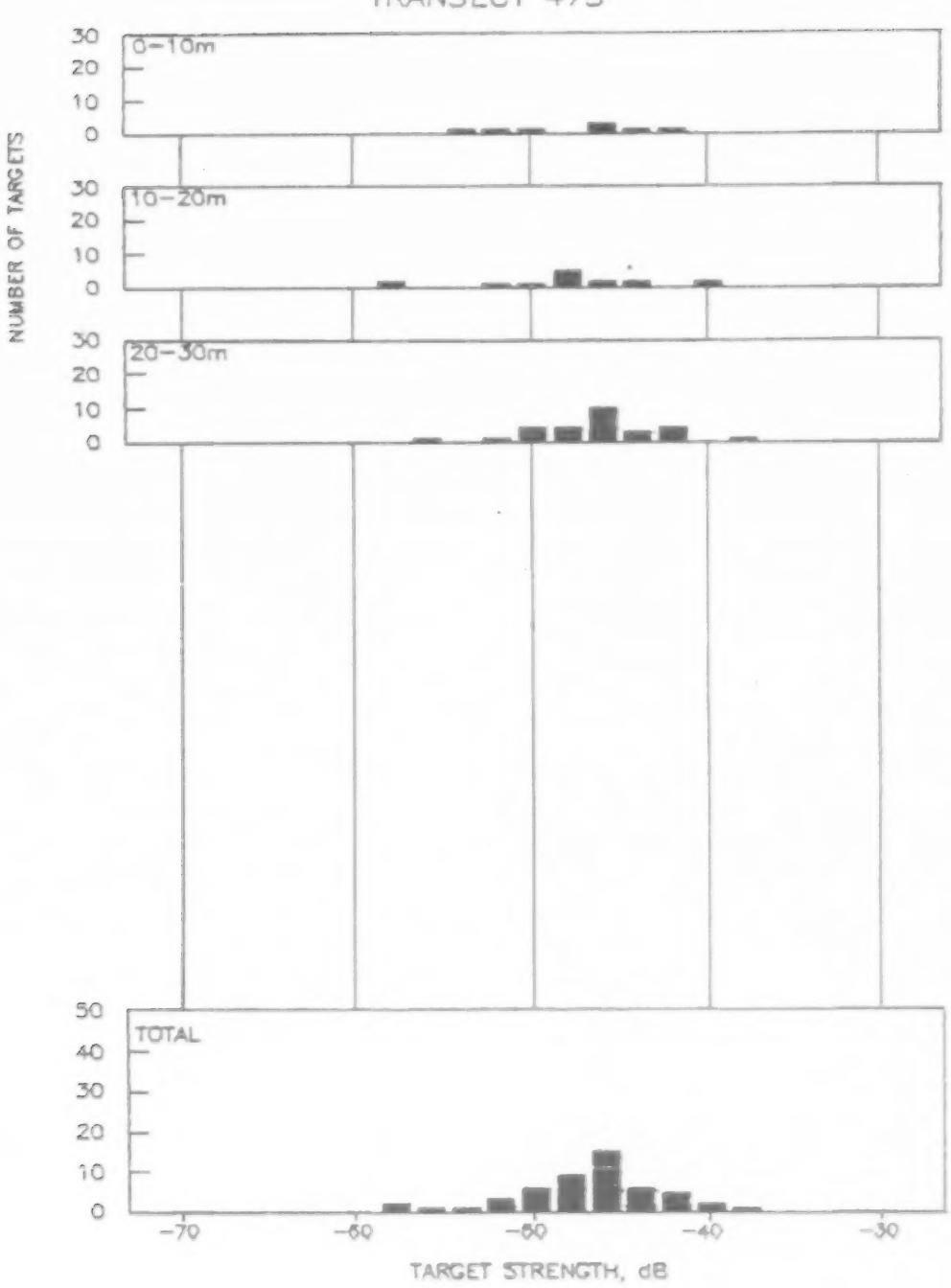

TRANSECT 40A
0–10m
10–20m
20–30m
30–40m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

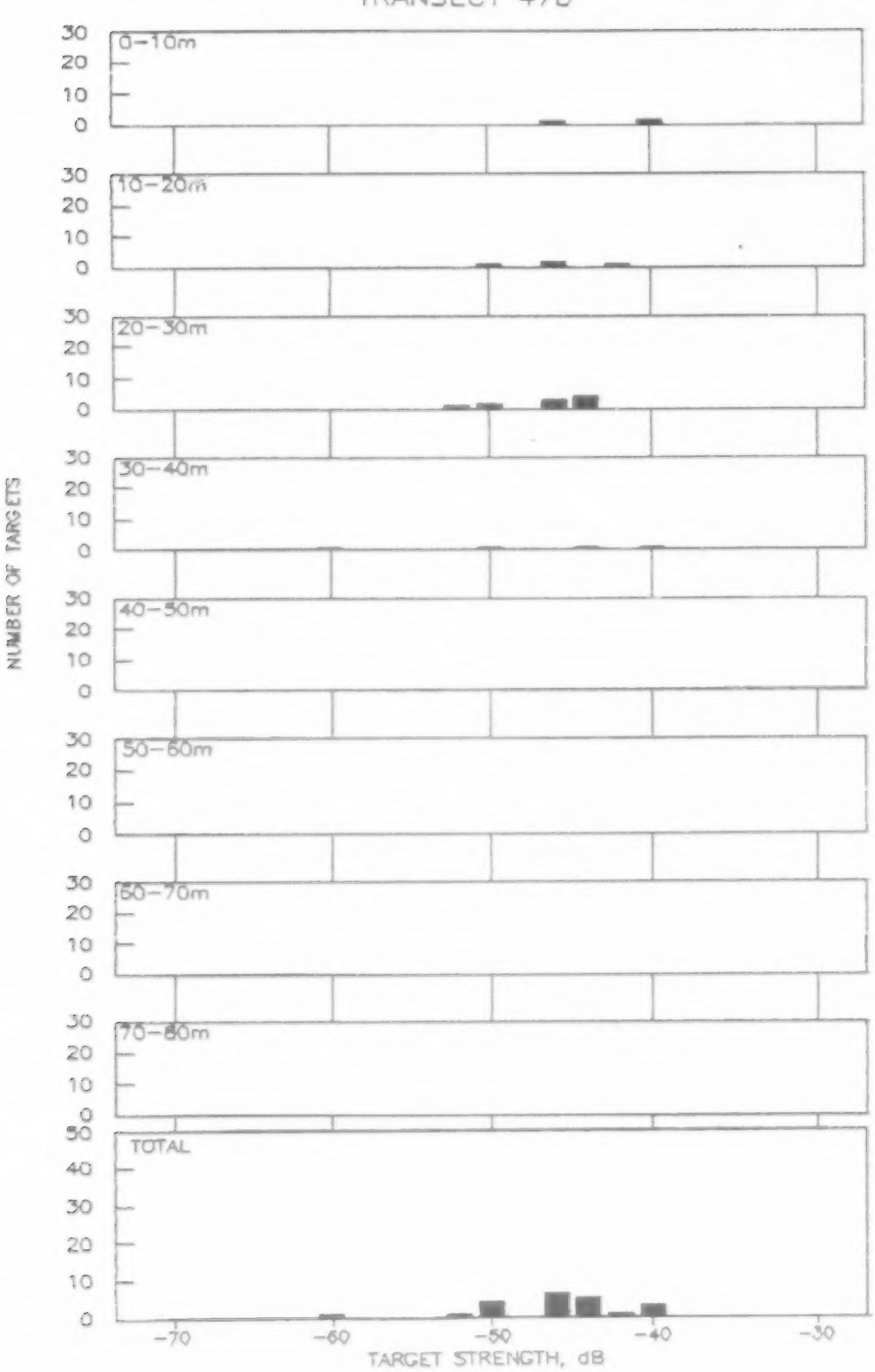

TRANSECT 43A
0–10m
10–20m
20–30m
TOTAL
NUMBER OF TARGETS
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

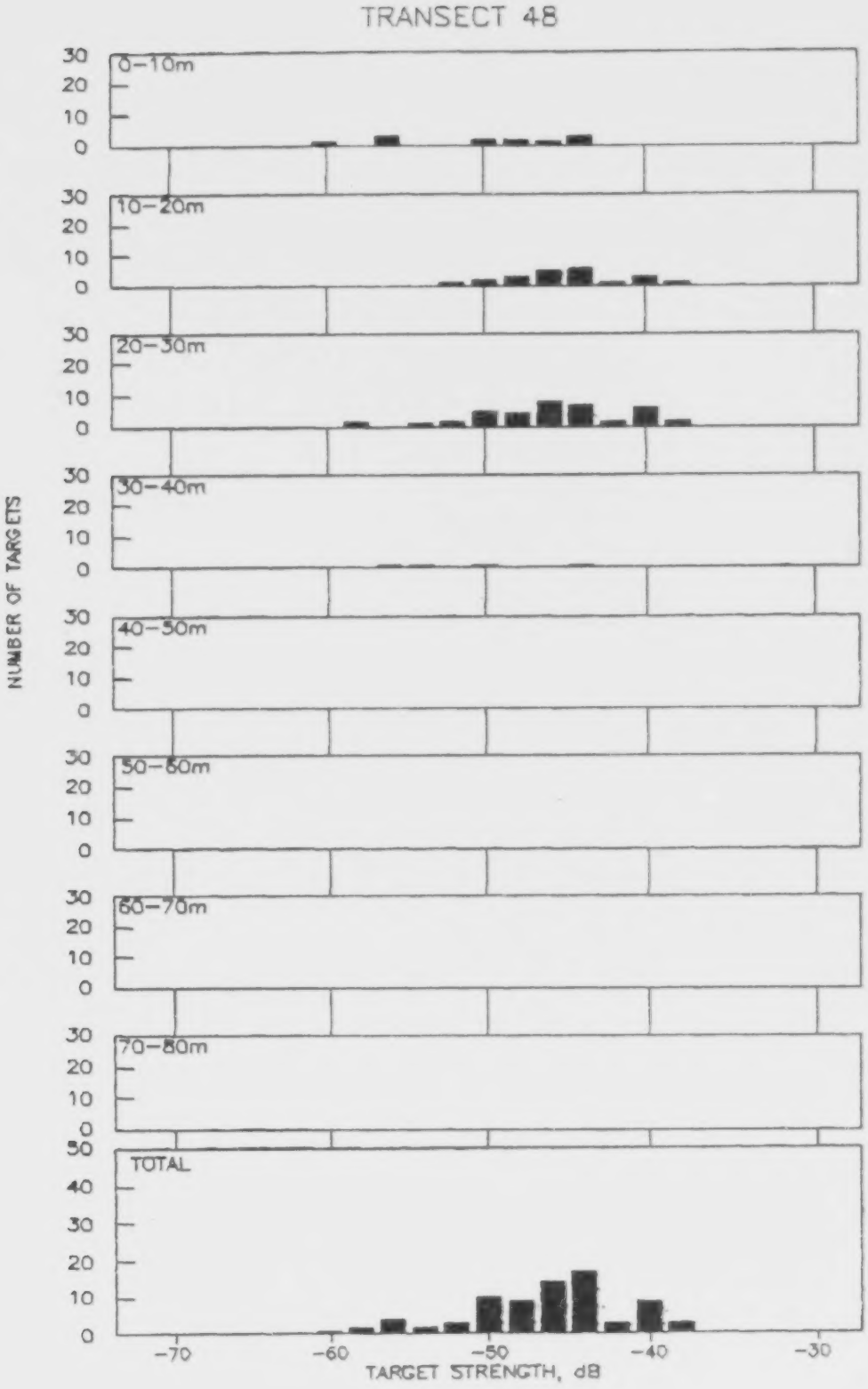

TRANSECT 43B
NUMBER OF TARGETS
0–10m
10–20m
20–30m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

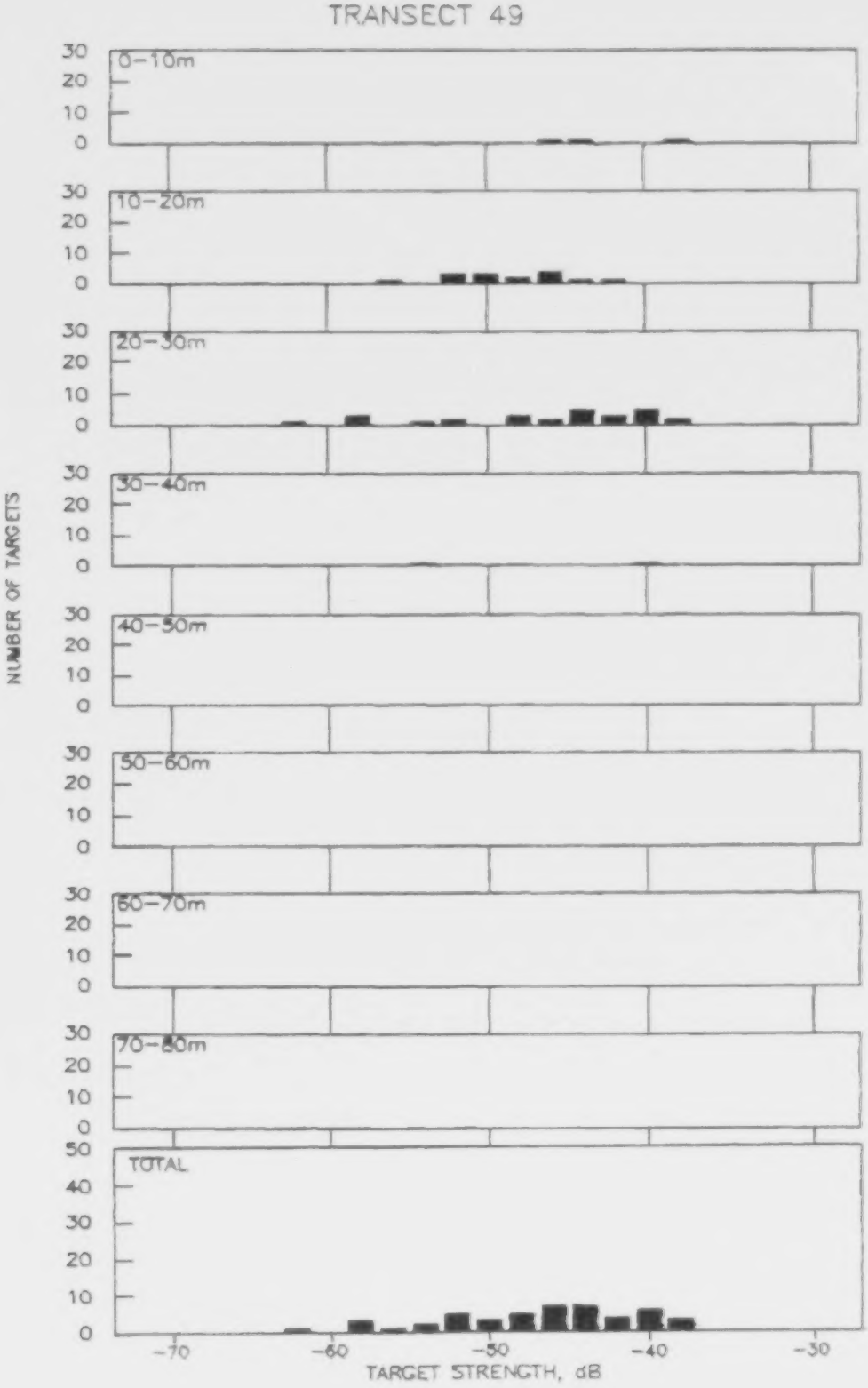

TRANSECT 44A
0–10m
10–20m
20–30m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

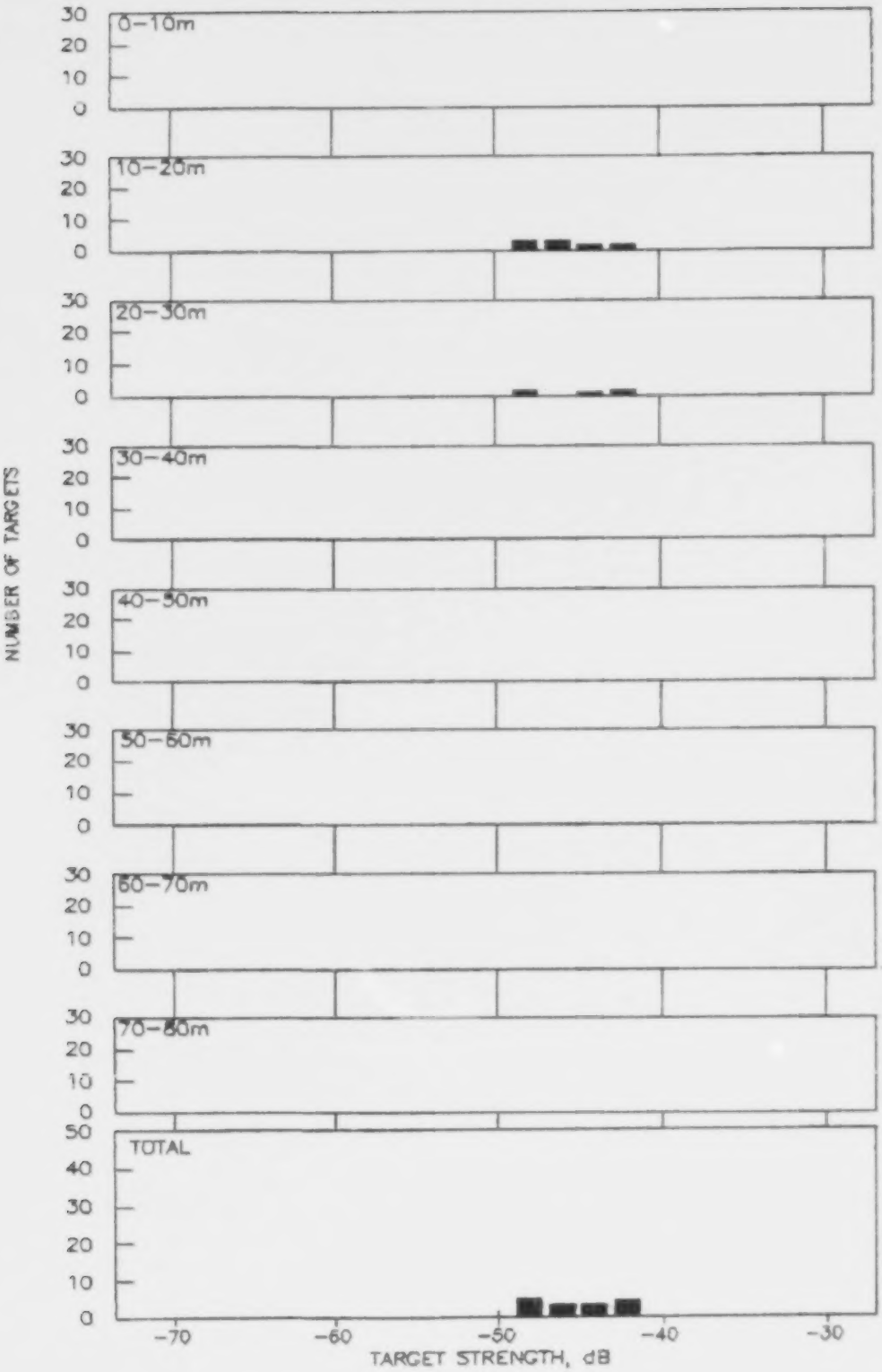

TRANSECT 44B
0–10m
10–20m
20–30m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
30
20
10
0
50
40
−70
−60
−50
−40
−30

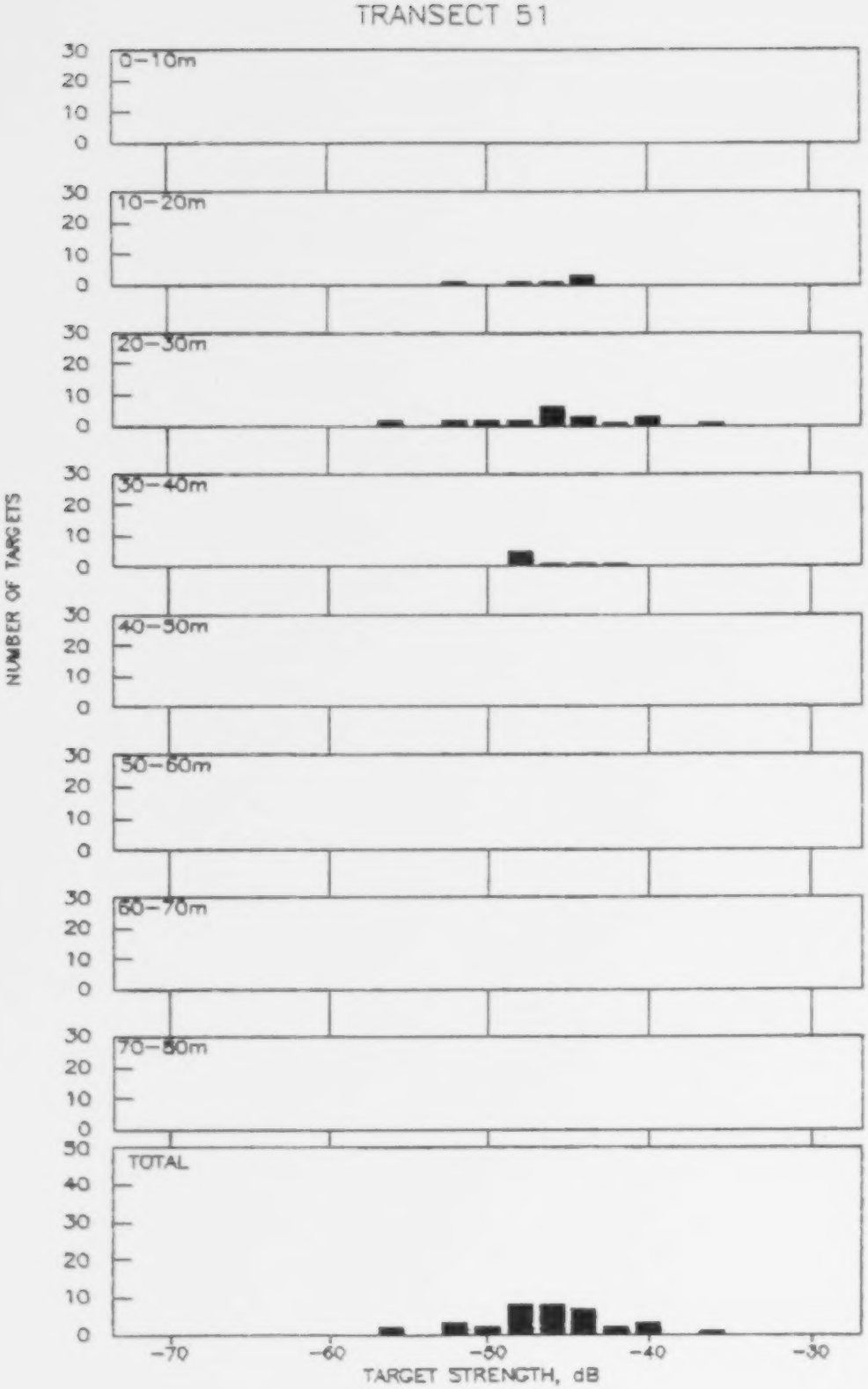

TRANSECT 47S
NUMBER OF TARGETS
0–10m
10–20m
20–30m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

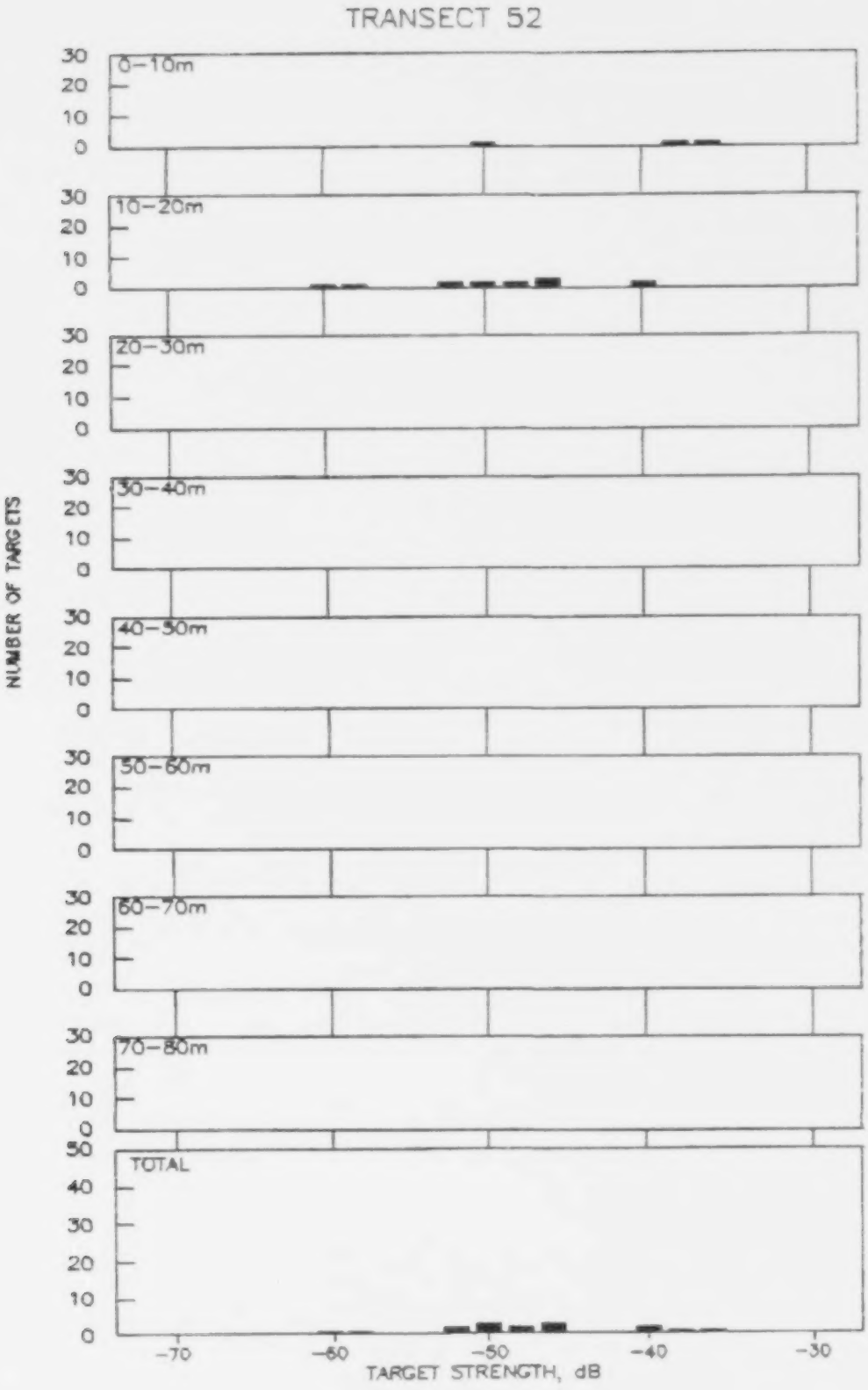

TRANSECT 47D
0-10m
10-20m
20-30m
30-40m
40-50m
50-60m
60-70m
70-80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

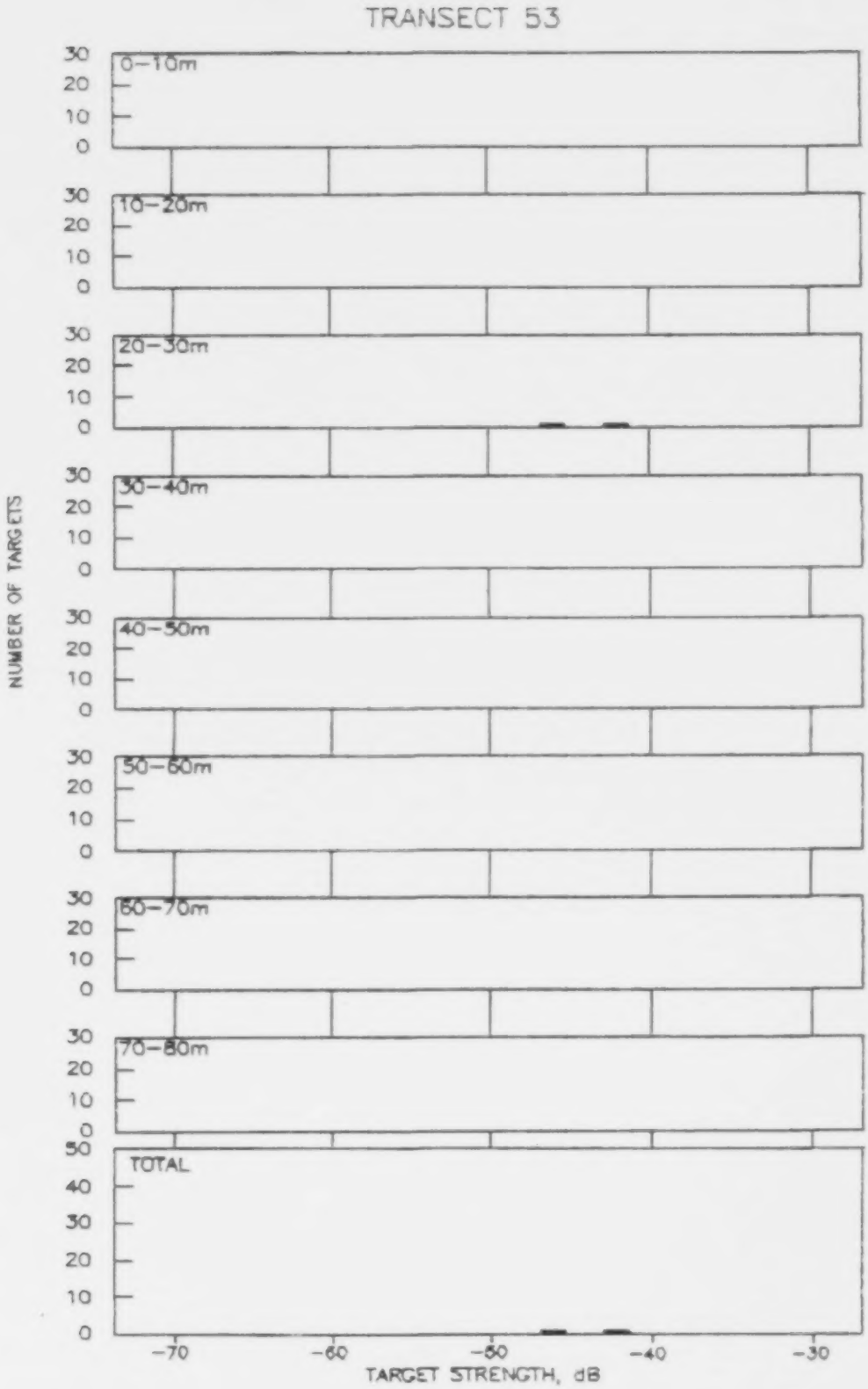

TRANSECT 48
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

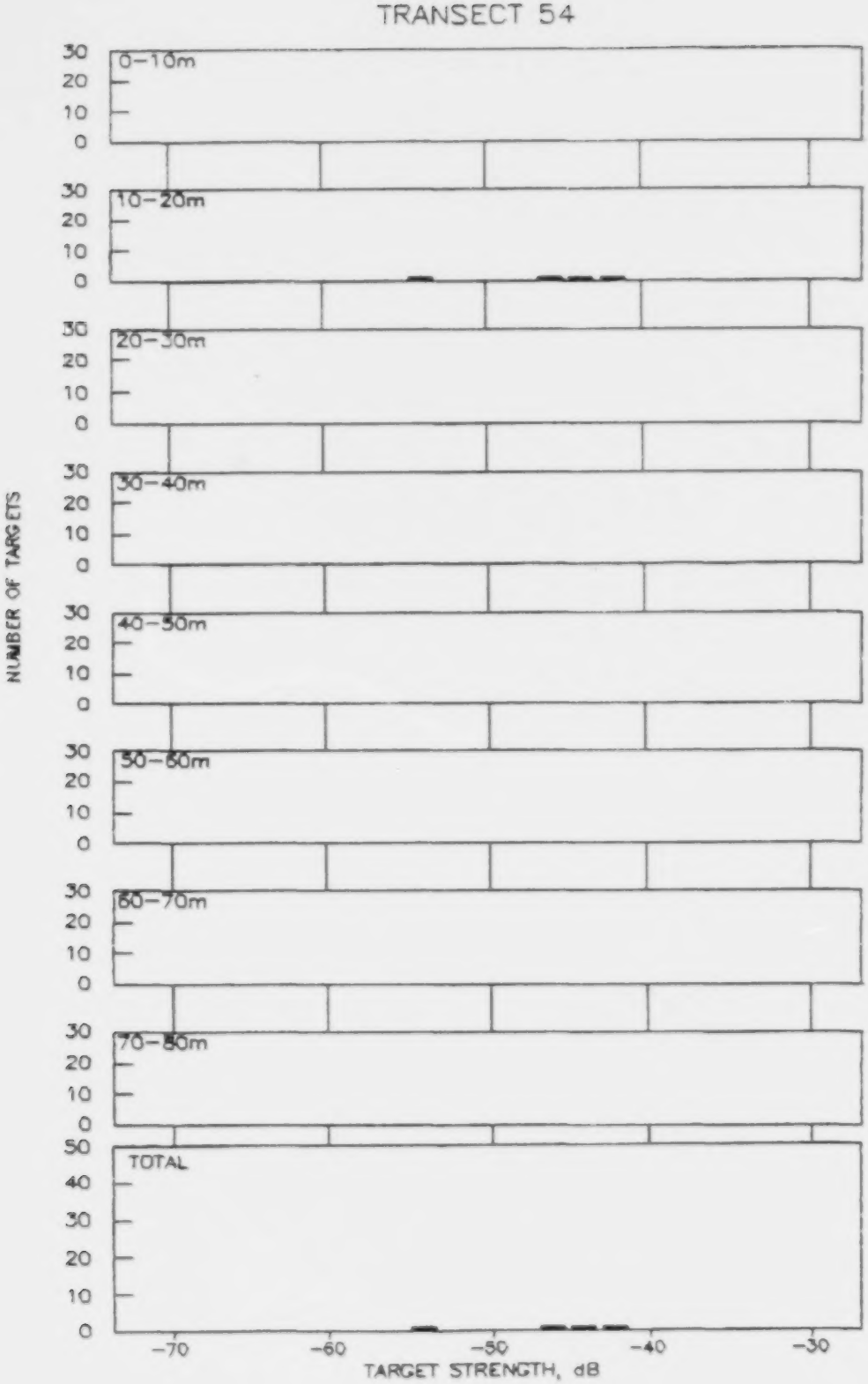

TRANSECT 49
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

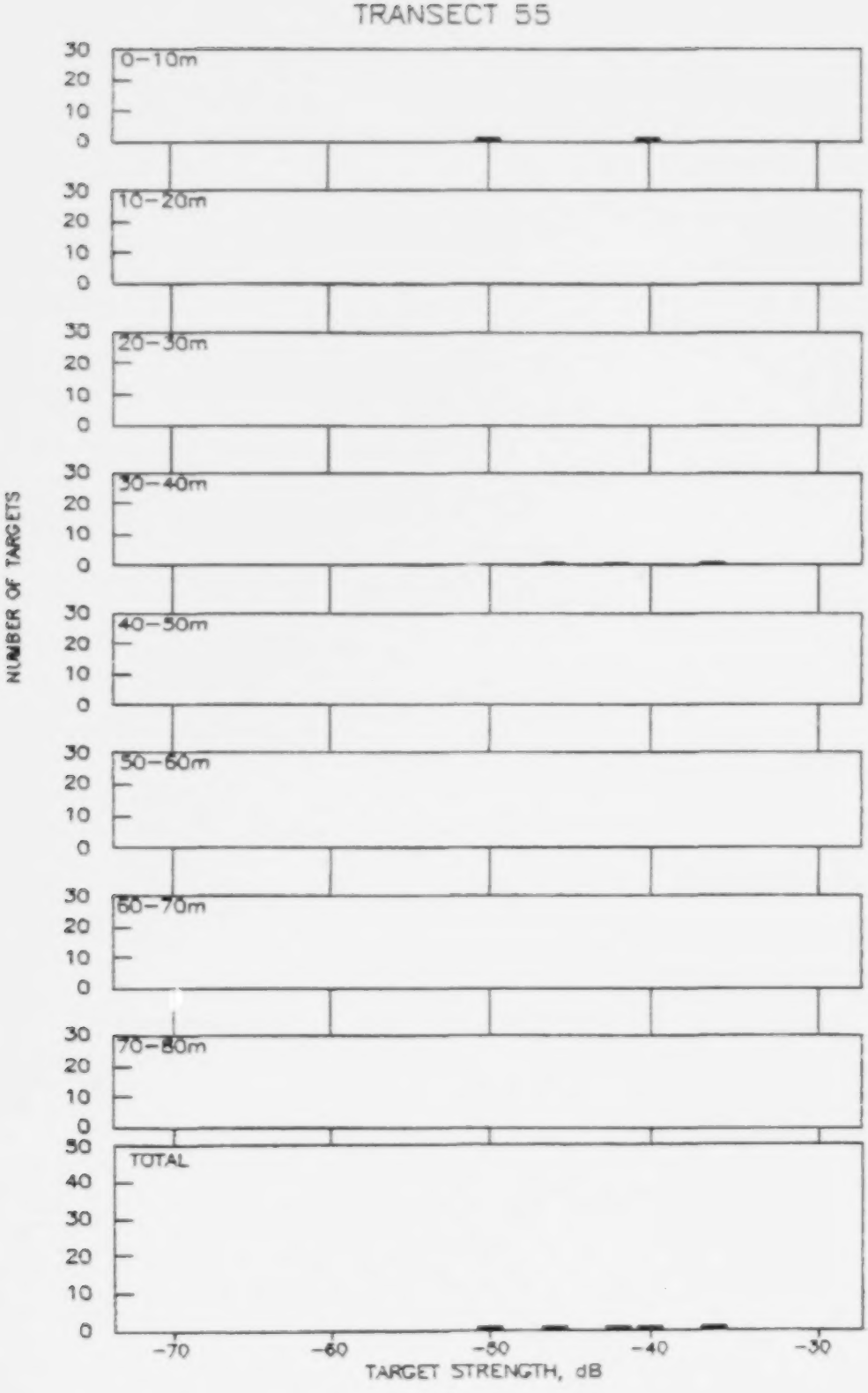

TRANSECT 50
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
50
40
-70
-60
-50
-40
-30
NUMBER OF TARGETS
TARGET STRENGTH, dB

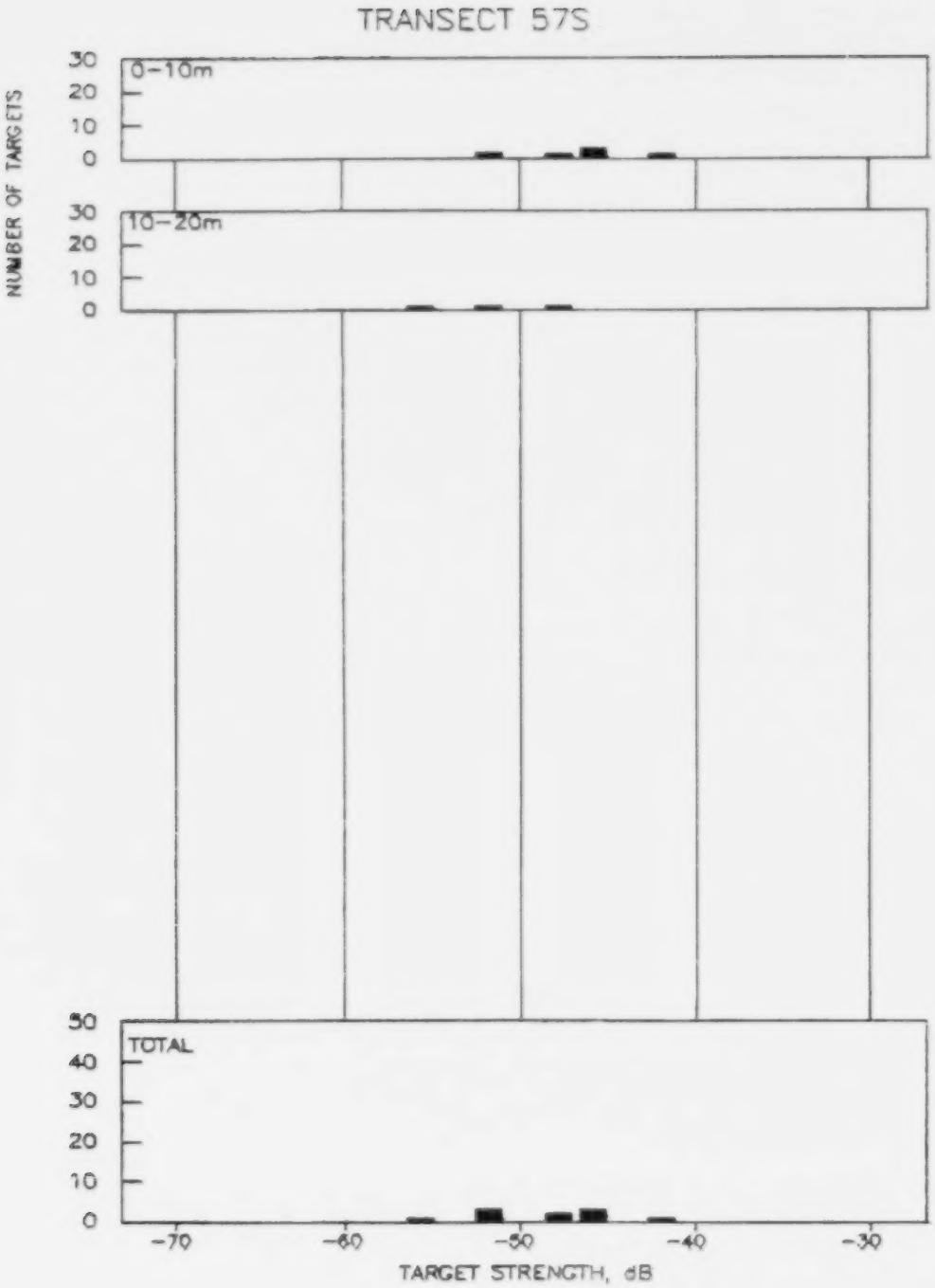

TRANSECT 51
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

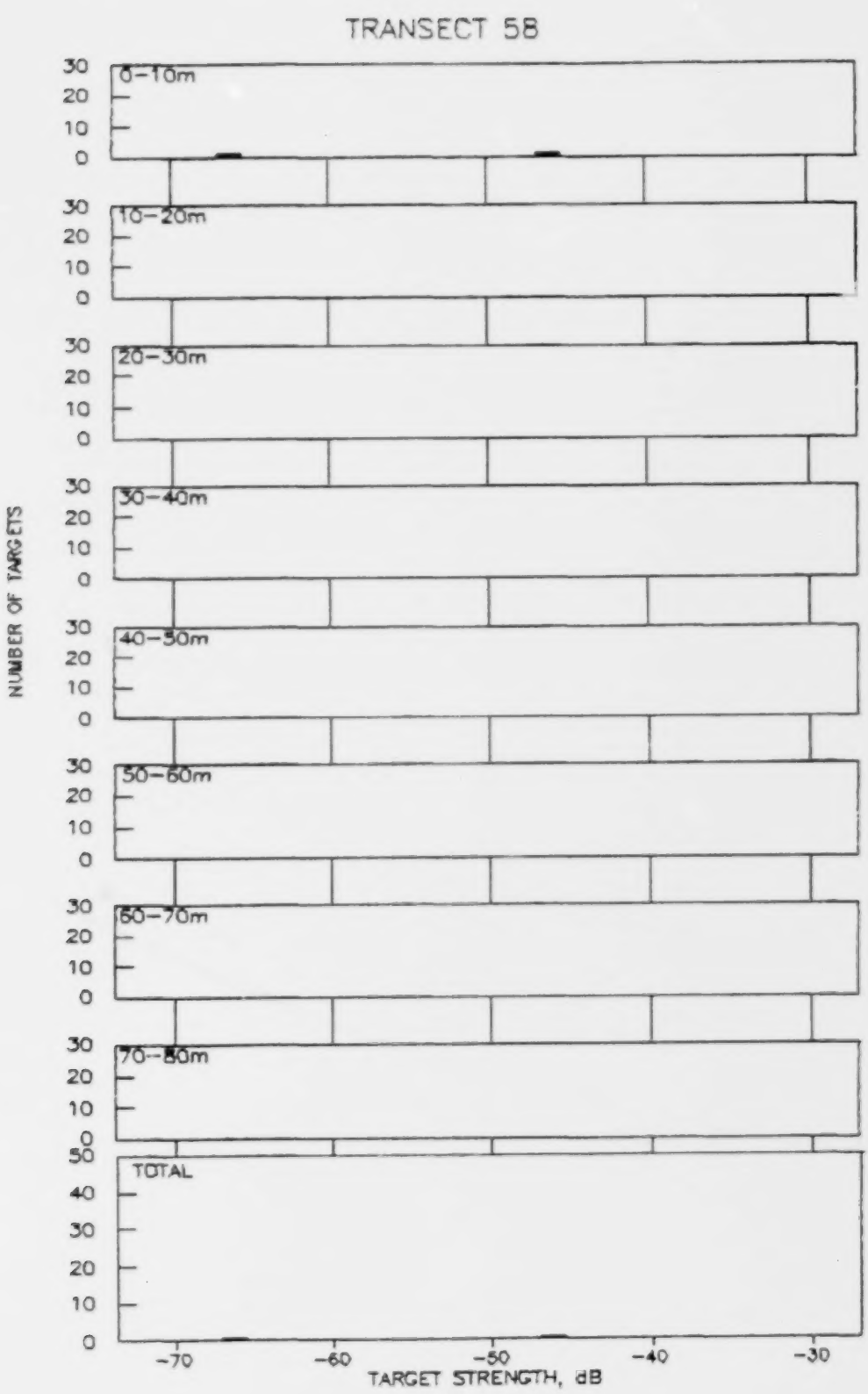

TRANSECT 52
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

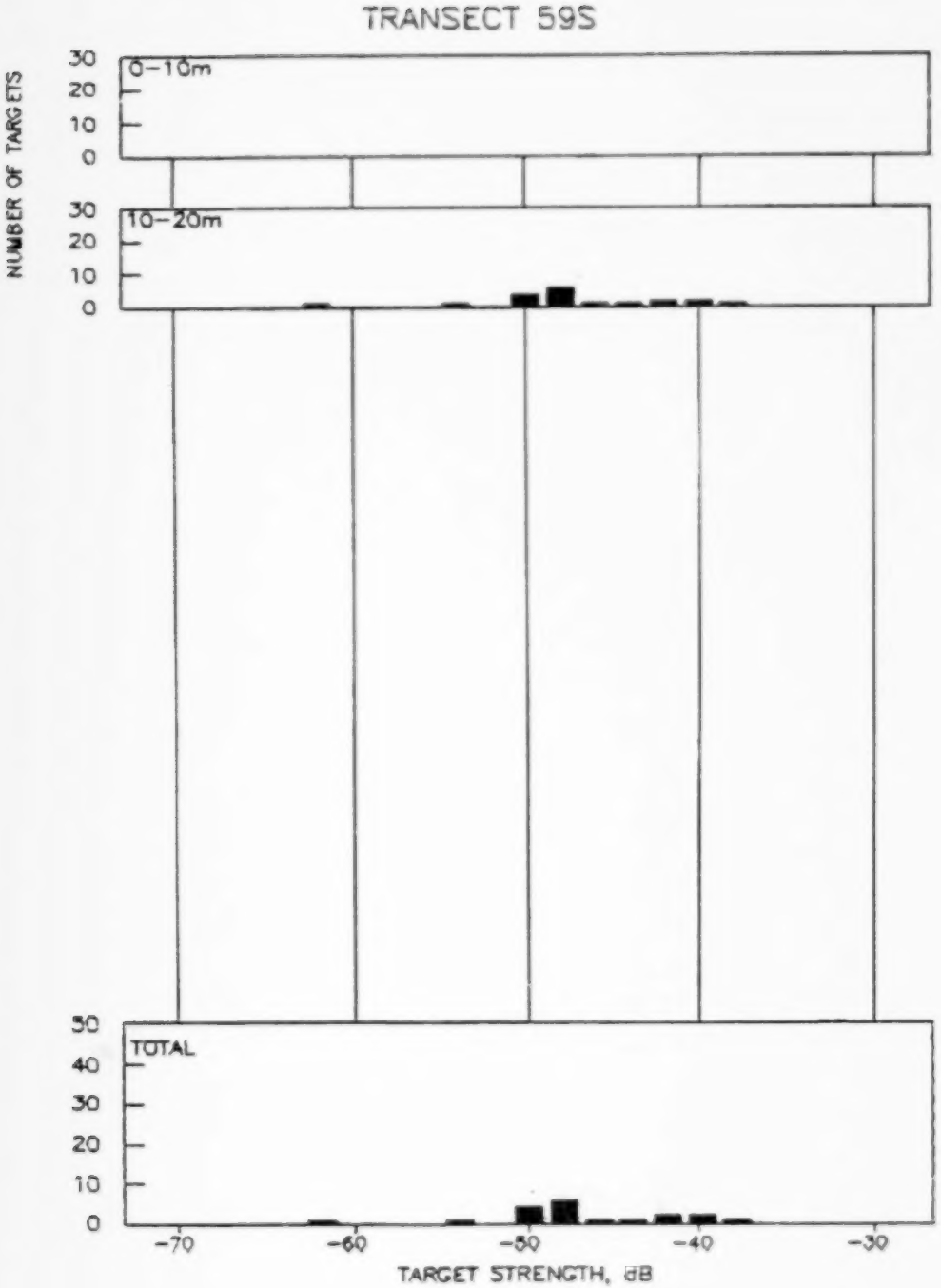

TRANSECT 53
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

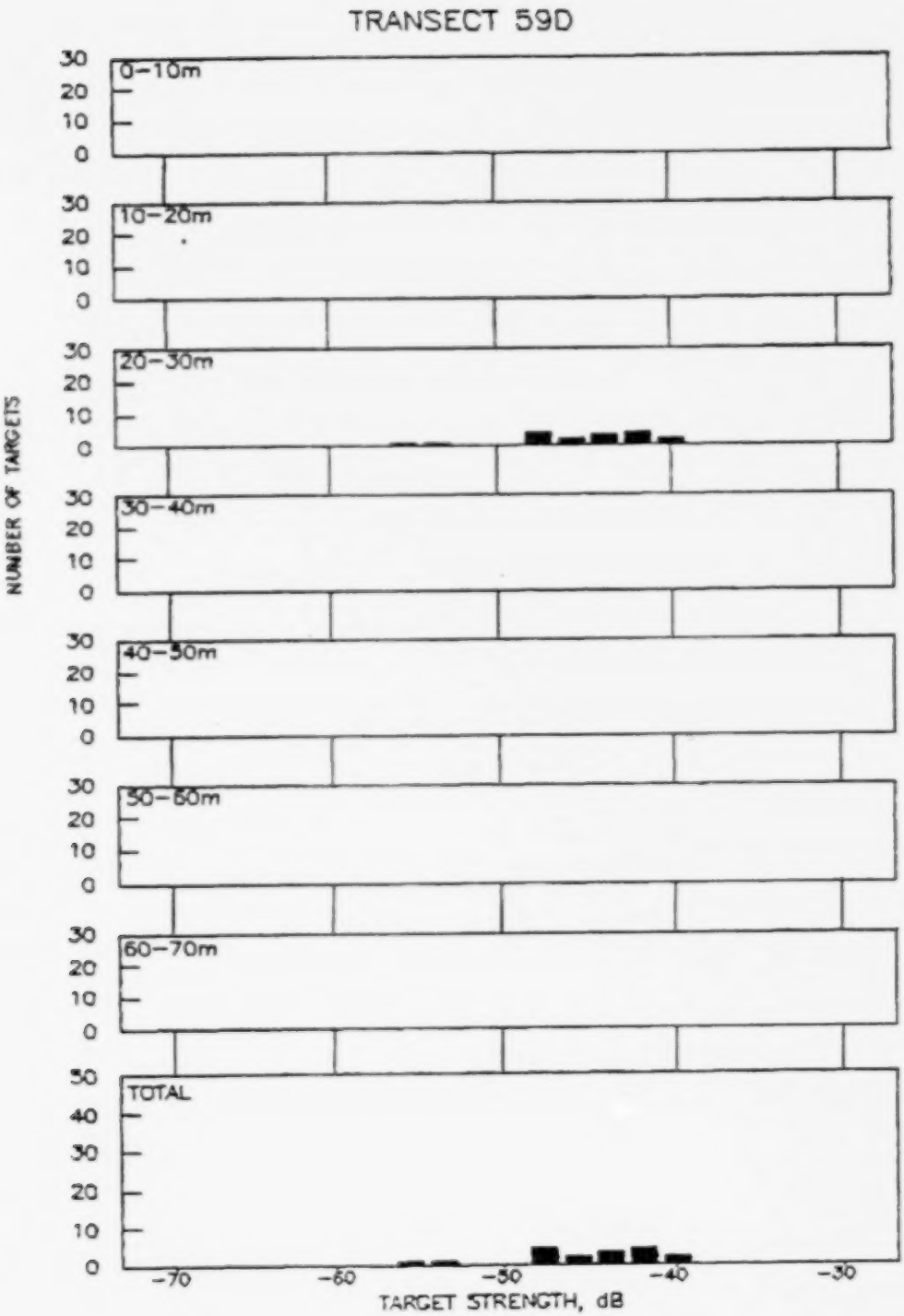

TRANSECT 54
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

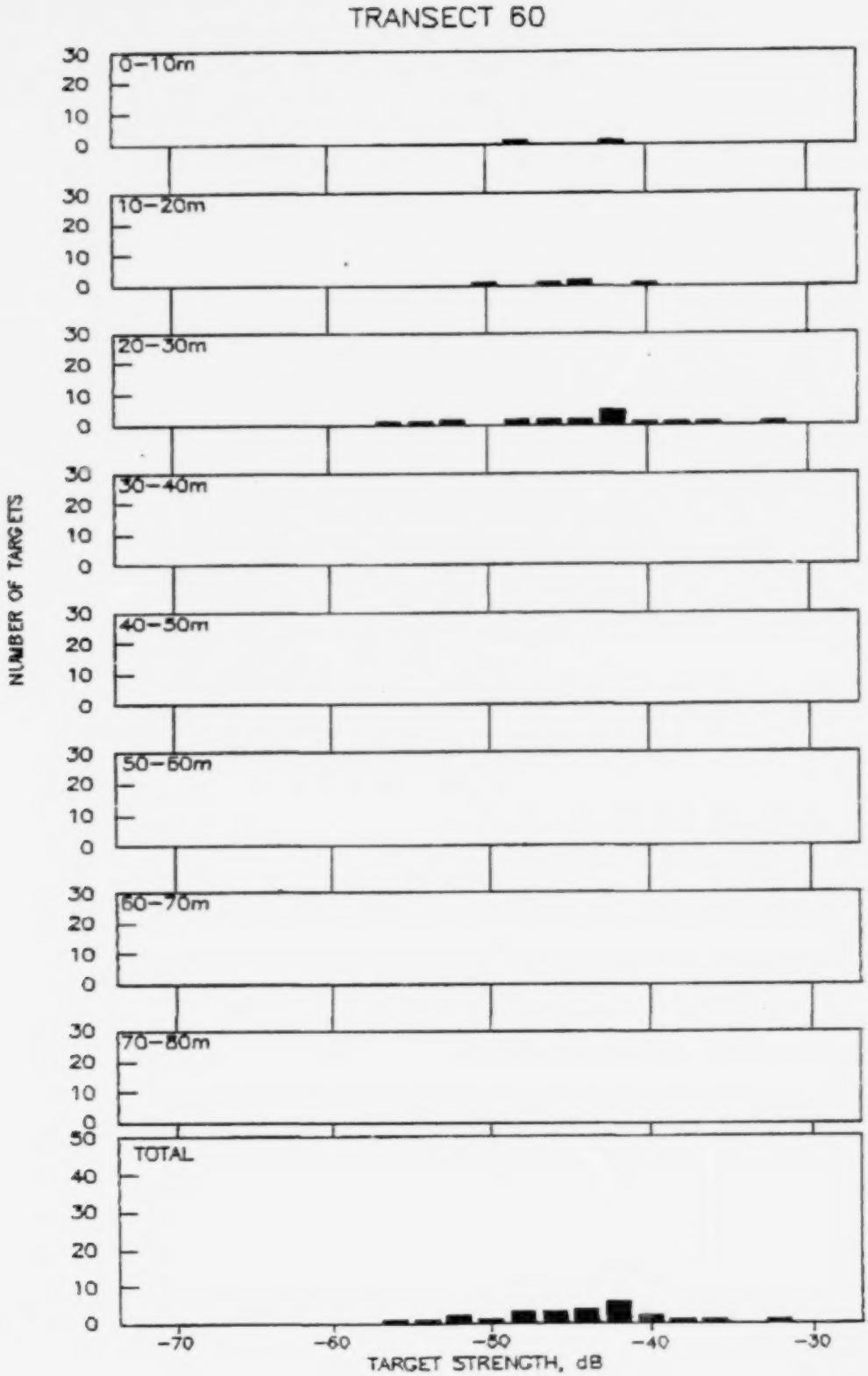

TRANSECT 55
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

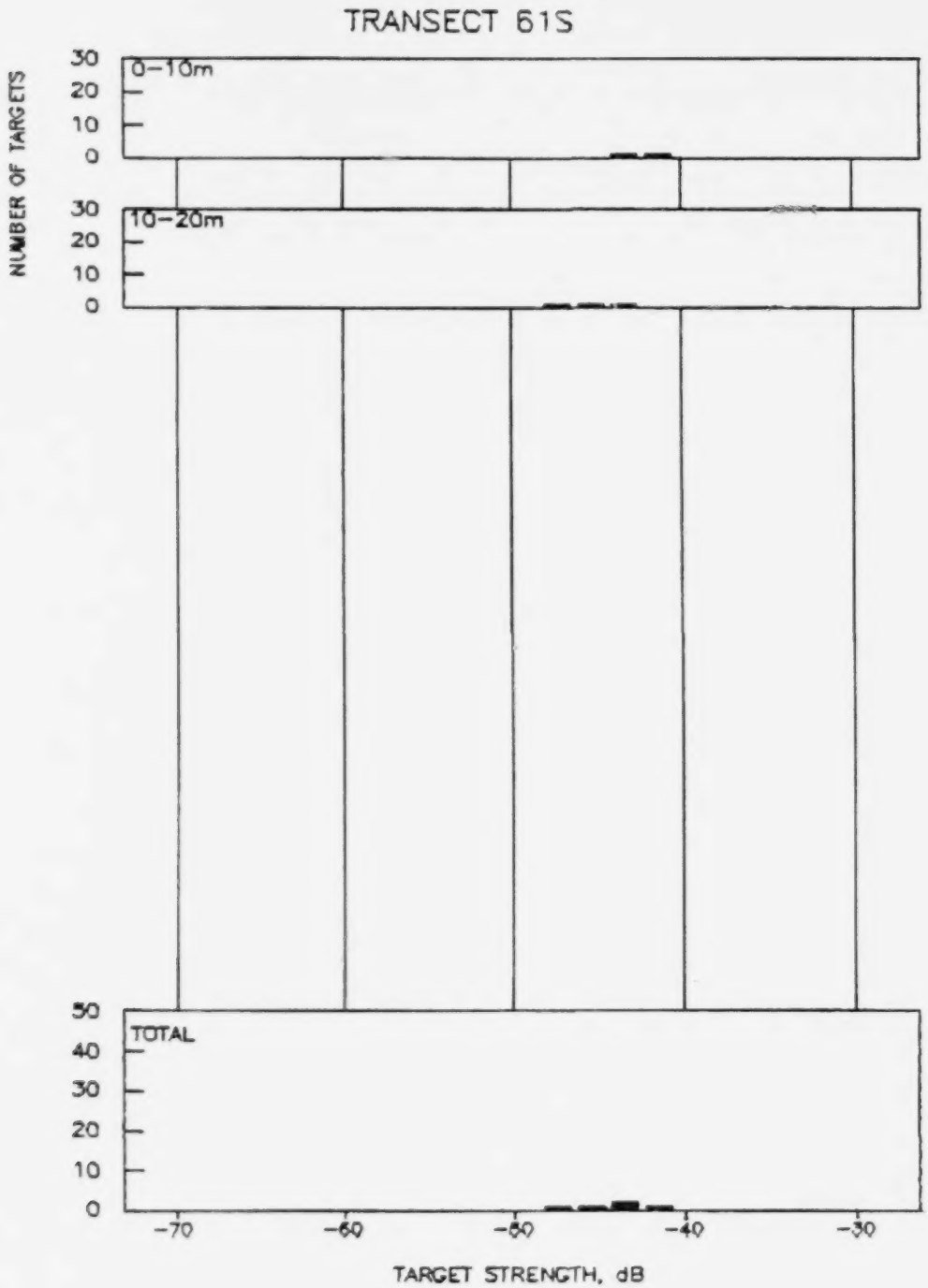

TRANSECT 57S
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

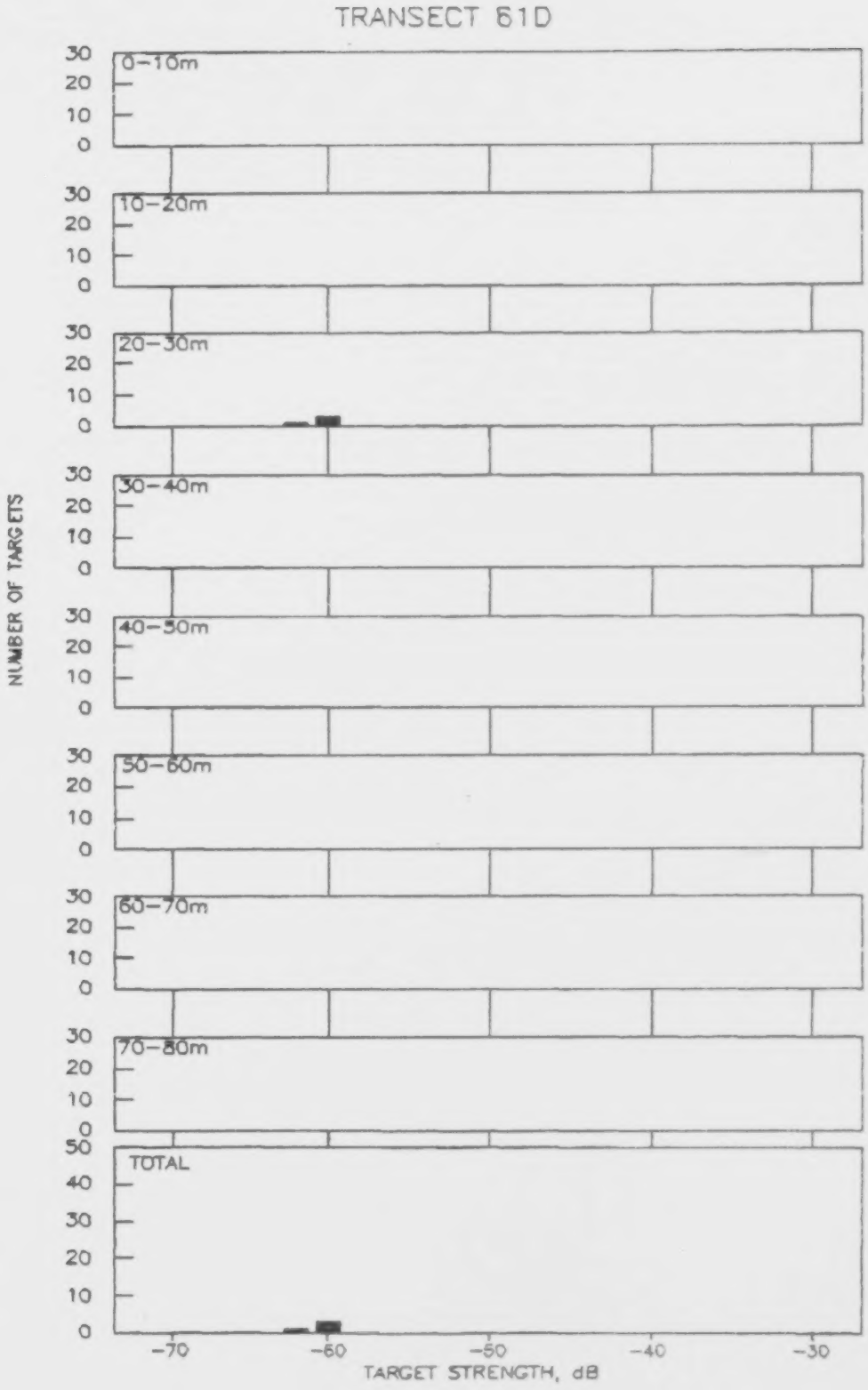

TRANSECT 5B
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
NUMBER OF TARGETS
TARGET STRENGTH, dB

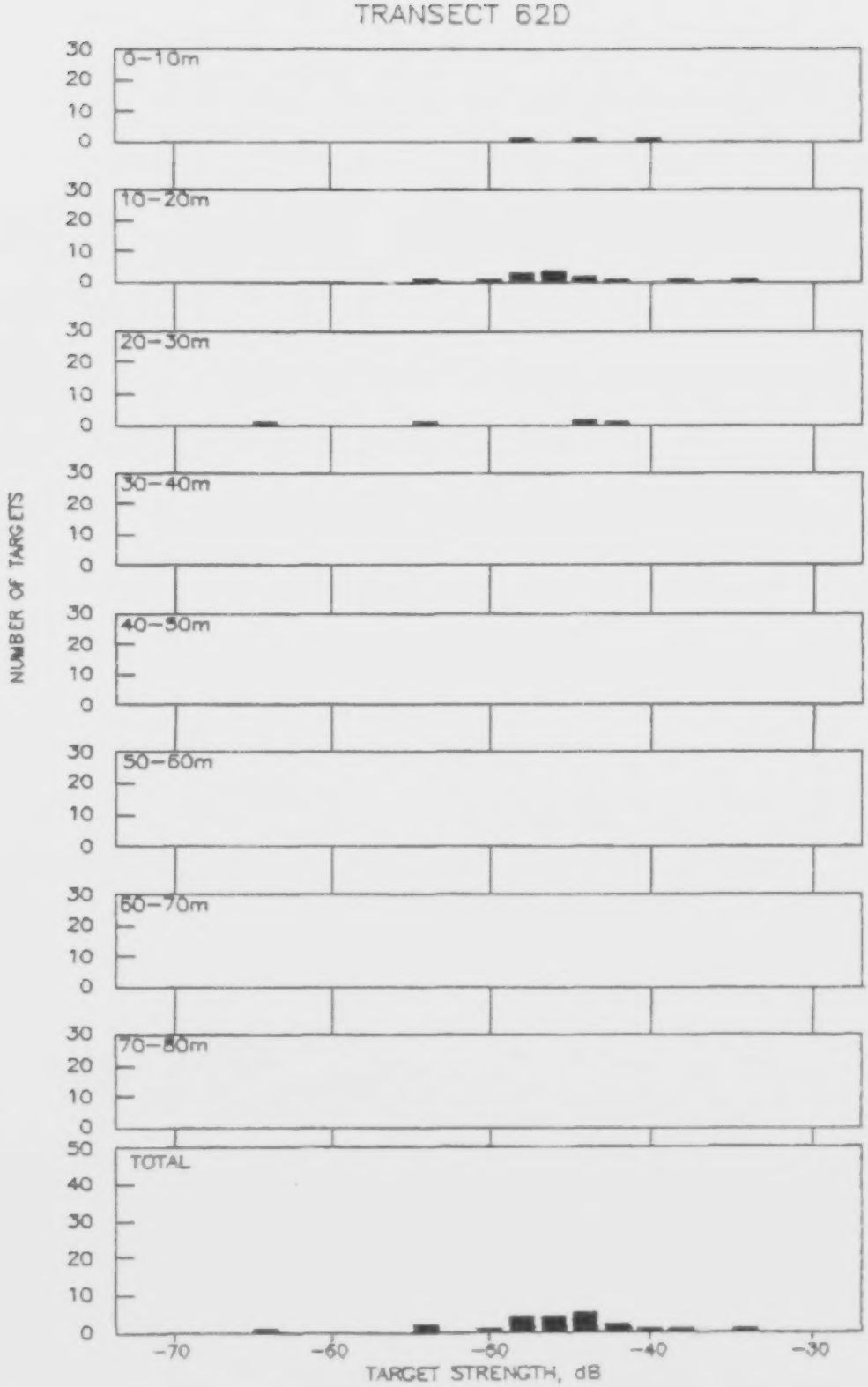

TRANSECT 59S
NUMBER OF TARGETS
0–10m
10–20m
TOTAL
30
20
10
0
50
40
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

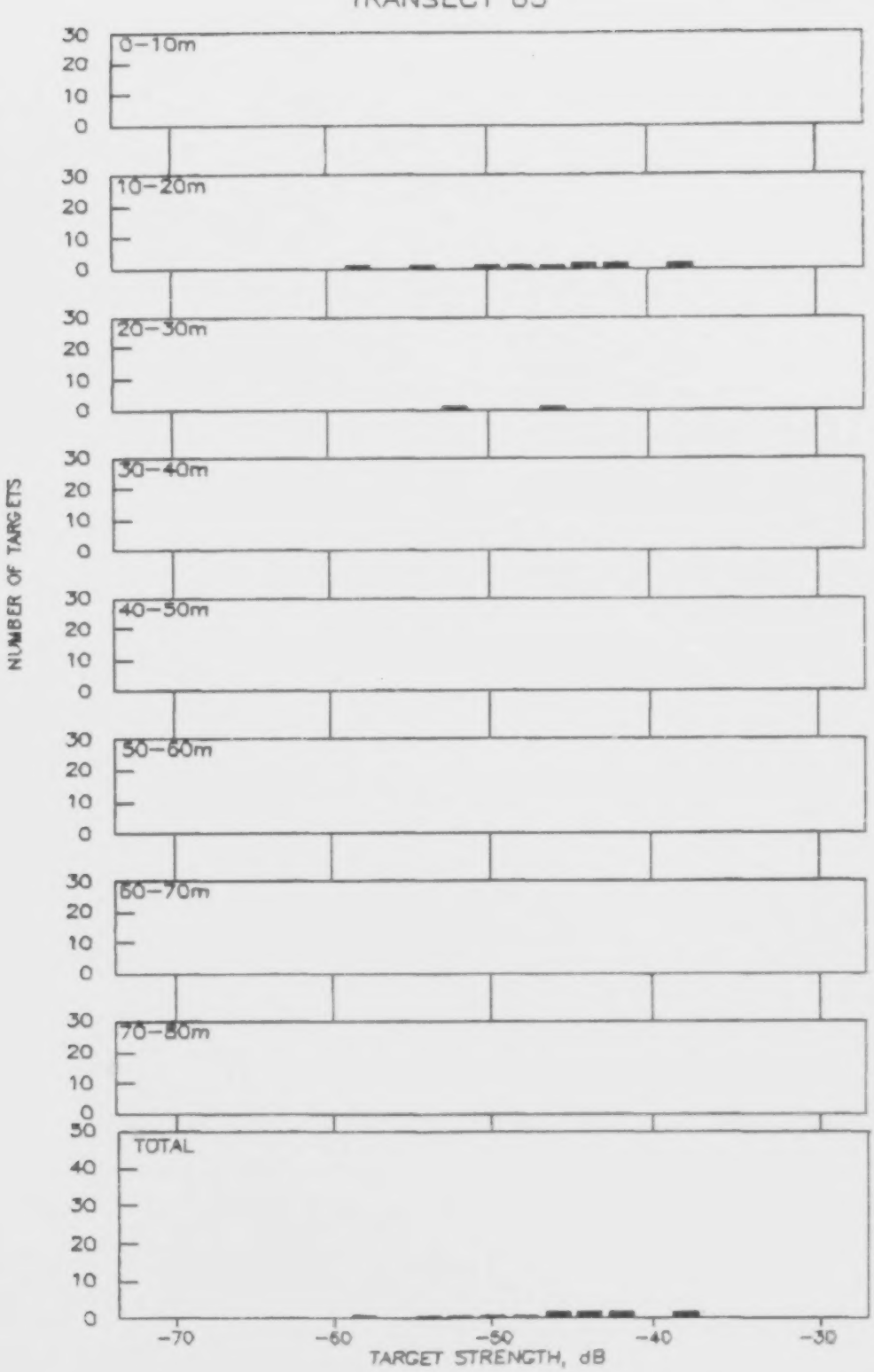

TRANSECT 59D
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
TOTAL
30
20
10
0
50
40
30
20
10
0
NUMBER OF TARGETS
−70
−60
−50
−40
−30
TARGET STRENGTH, dB

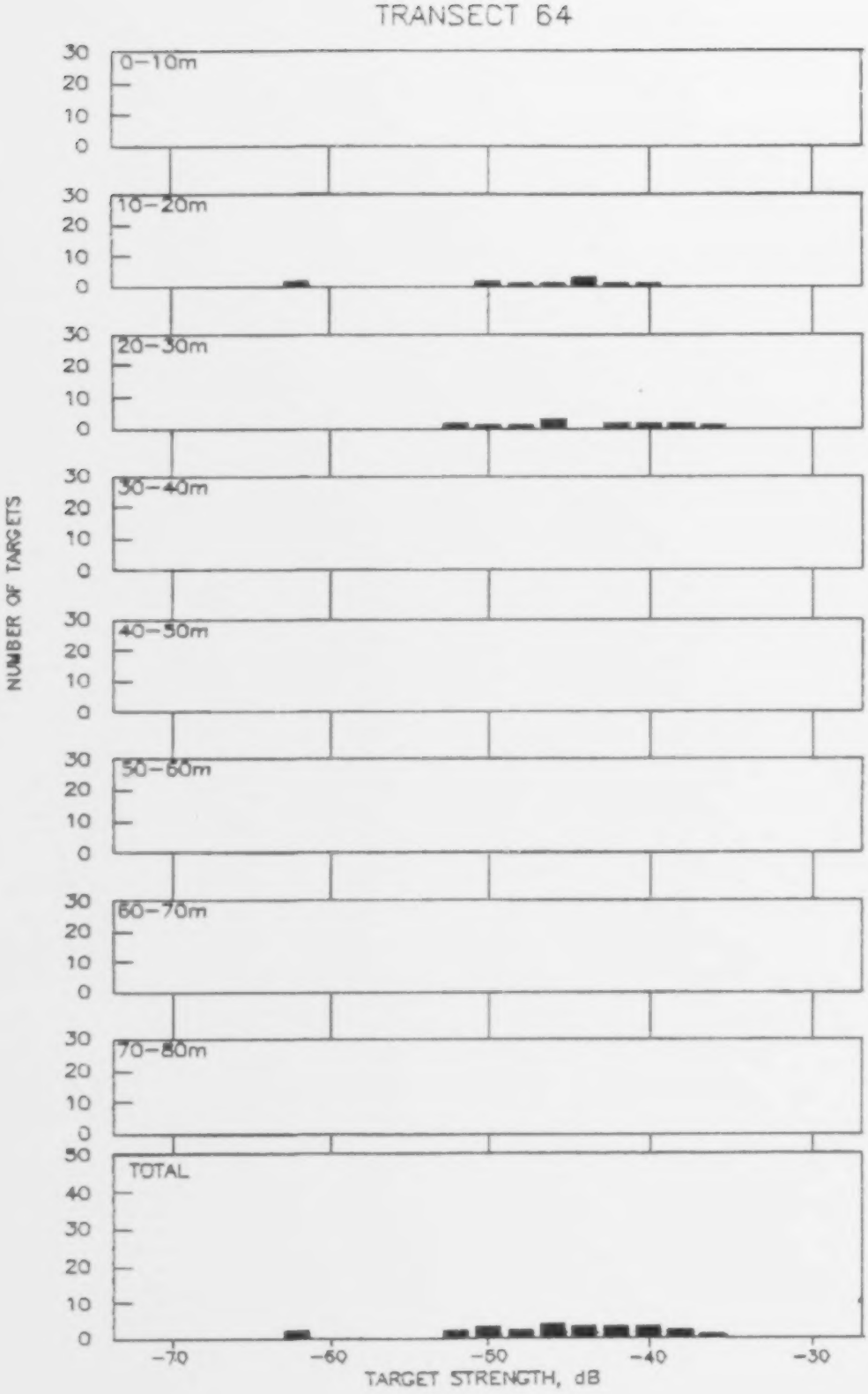

TRANSECT 60
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

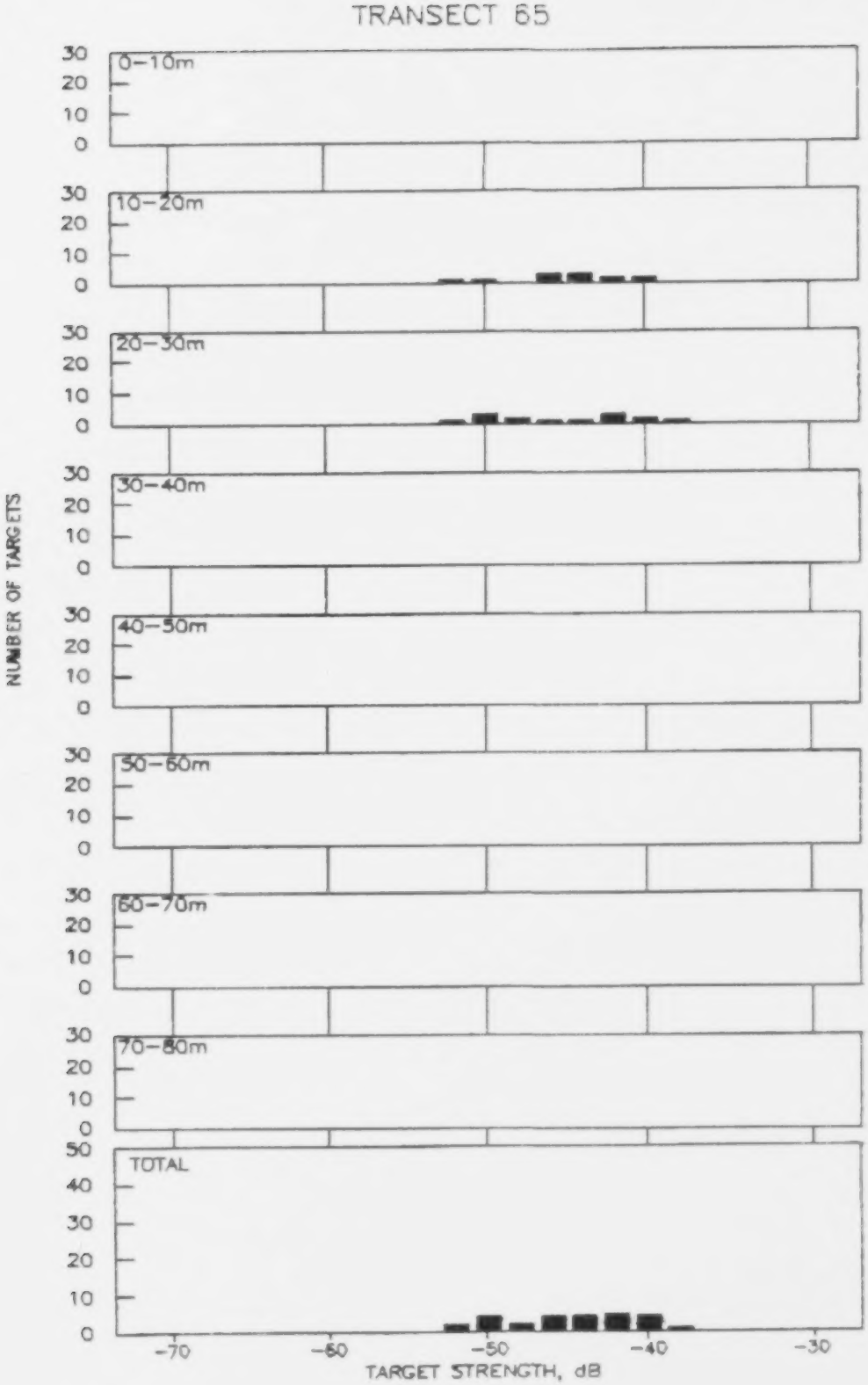

TRANSECT 61S
NUMBER OF TARGETS
0-10m
10-20m
TOTAL
30
20
10
0
50
40
-70
-60
-50
-40
-30
TARGET STRENGTH, dB

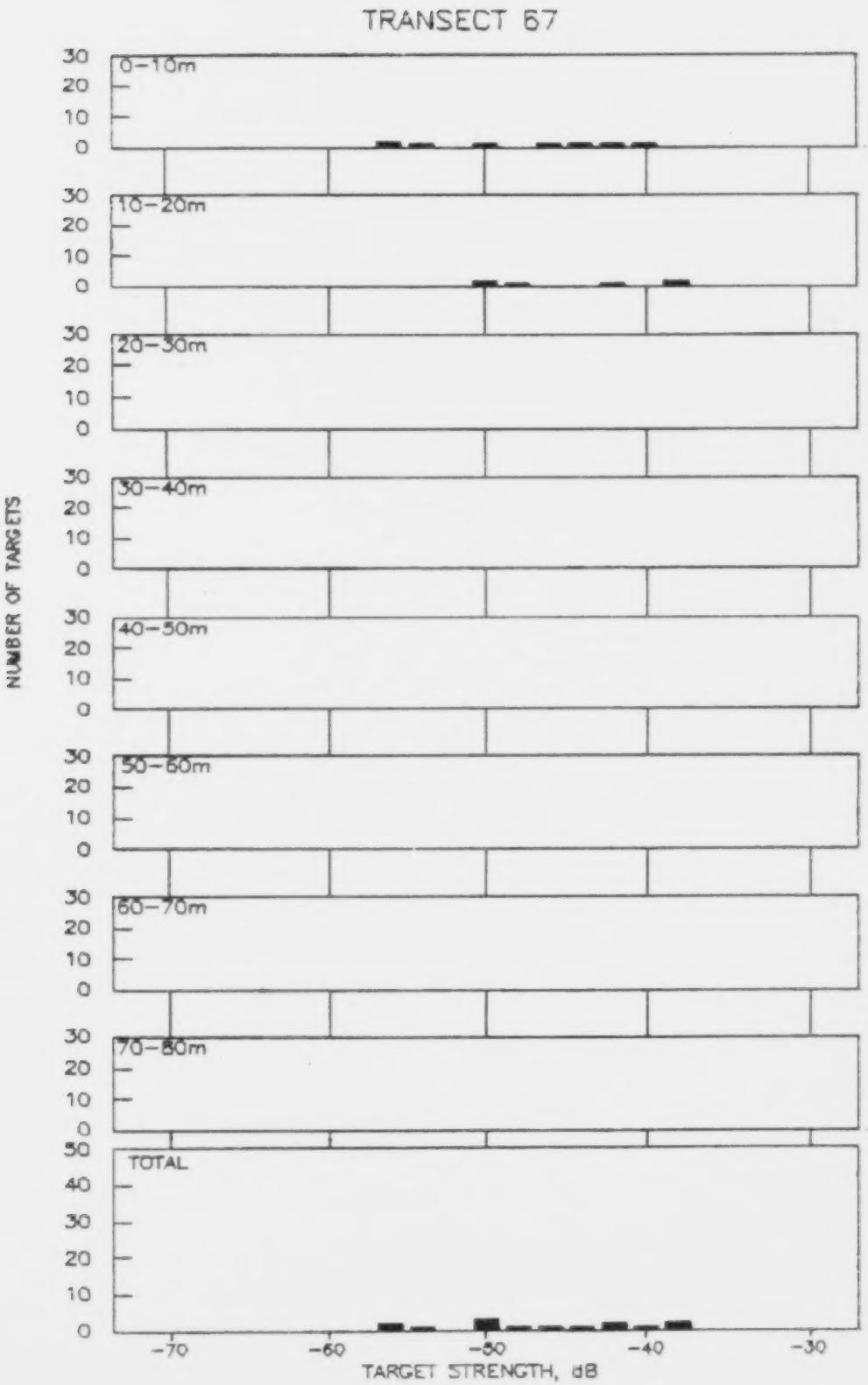

TRANSECT 61D
0-10m
10-20m
20-30m
30-40m
40-50m
50-60m
60-70m
70-80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

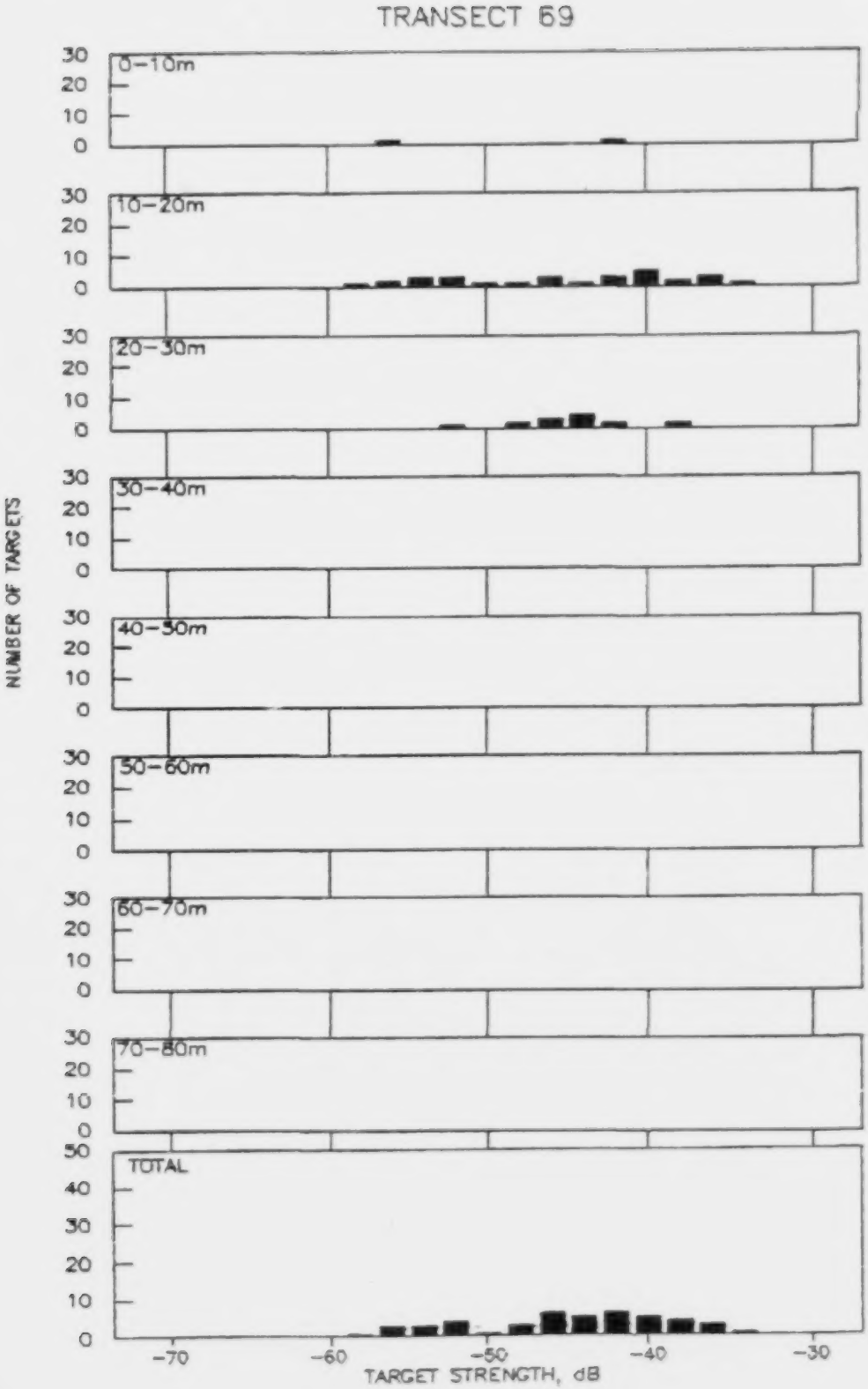

TRANSECT 62D
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30


TRANSECT 63
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30


TRANSECT 64
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30


TRANSECT 65
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

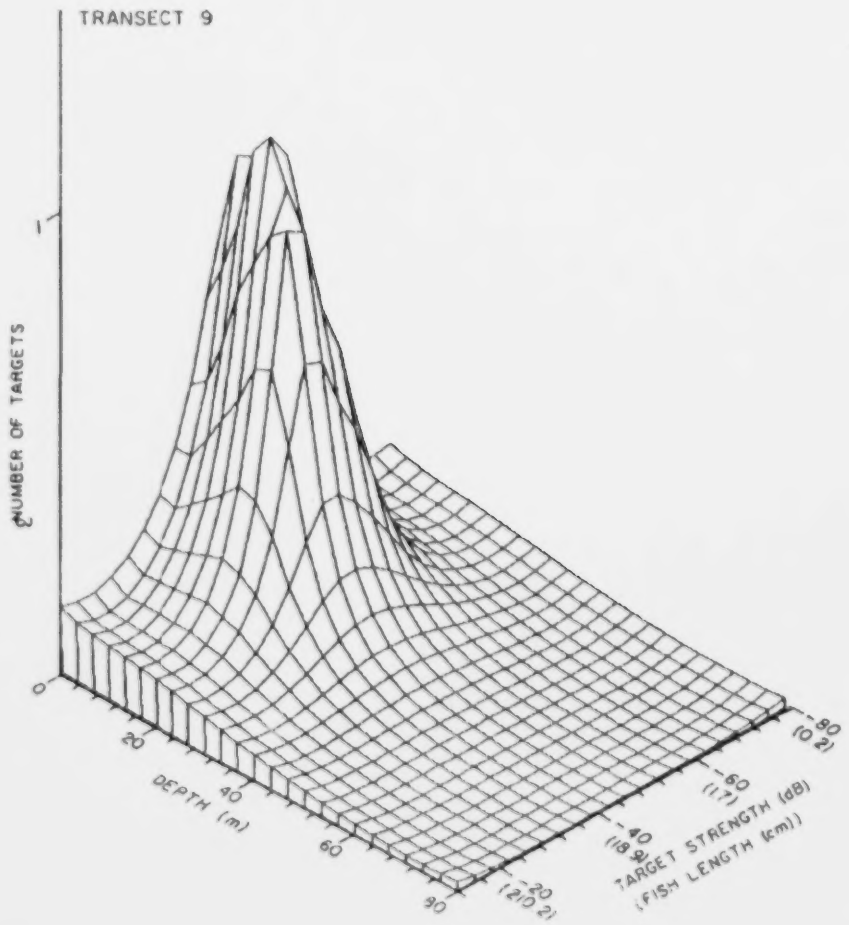

TRANSECT 67
0-10m
10-20m
20-30m
30-40m
40-50m
50-60m
60-70m
70-80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

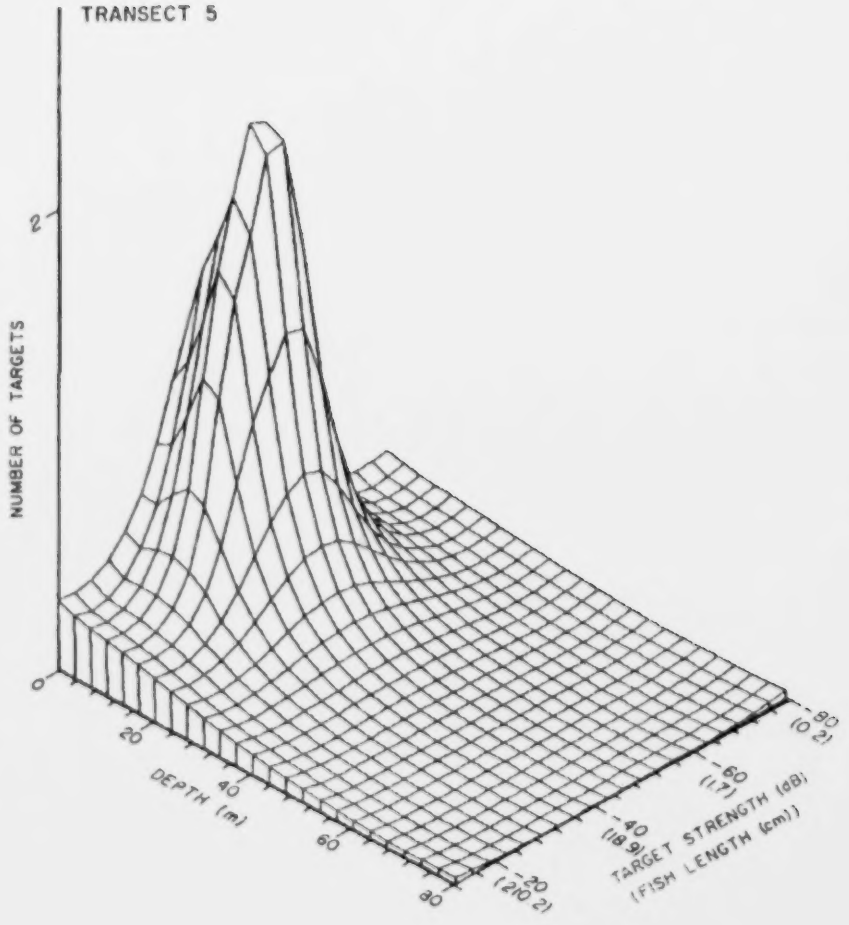

TRANSECT 69
0–10m
10–20m
20–30m
30–40m
40–50m
50–60m
60–70m
70–80m
TOTAL
NUMBER OF TARGETS
TARGET STRENGTH, dB
-70
-60
-50
-40
-30

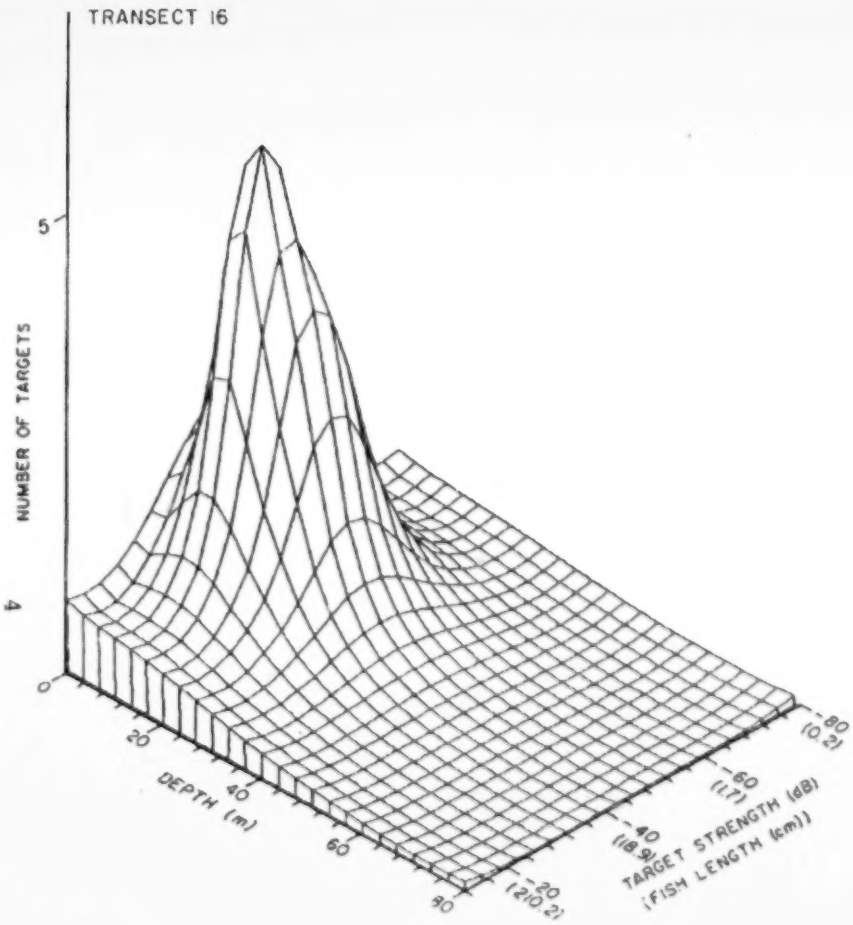
6.6 - Appendix F: 3-D plots of target strength vs depth.

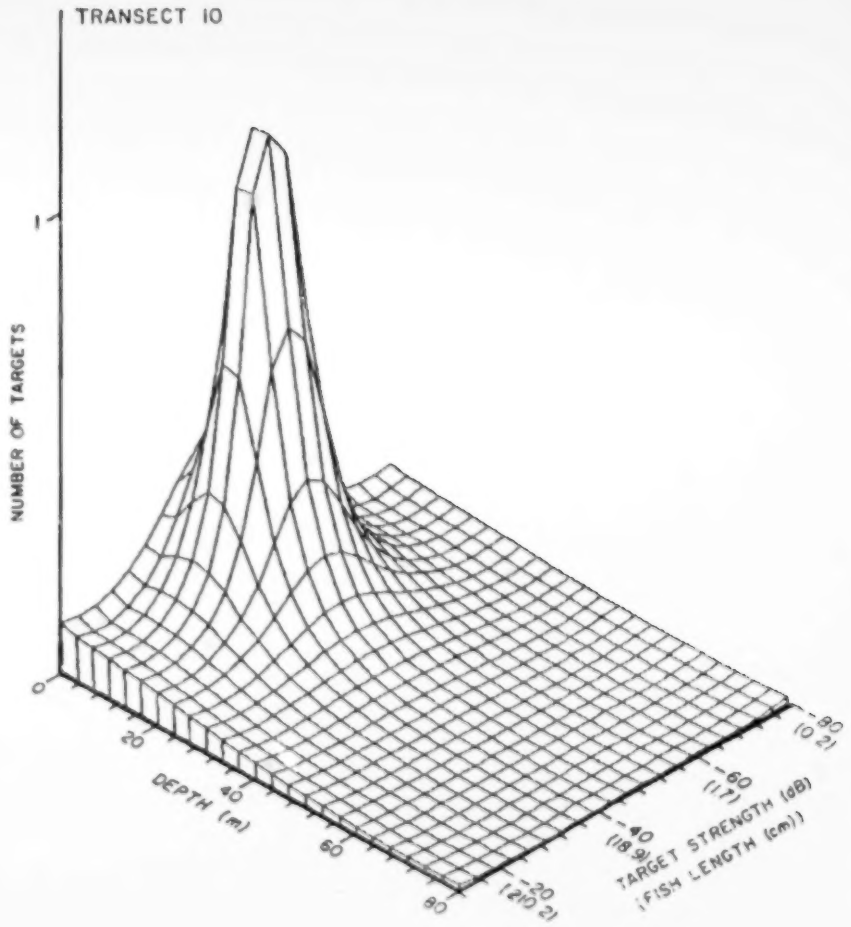
Three dimensional plots of acoustic target strengths by depths and number of targets for hydroacoustic surveys of Williston Lake, 1988.

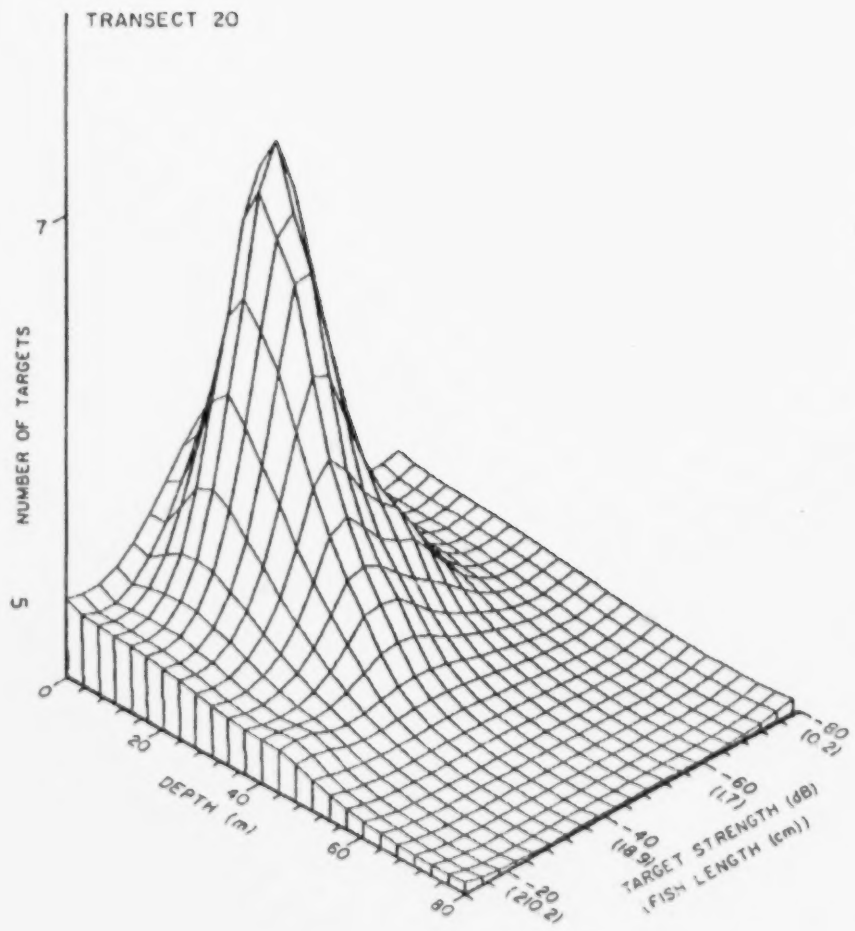
6.6.1 - Appendix F1 - June 1988

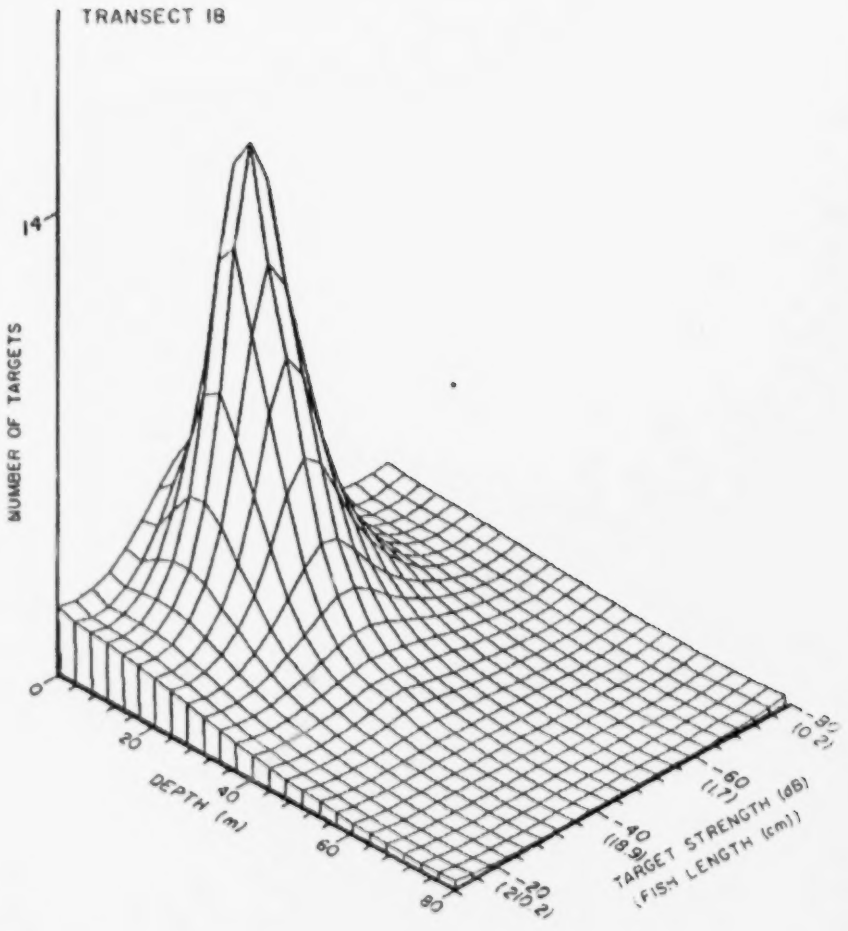

TRANSECT 9
NUMBER OF TARGETS
1
2
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

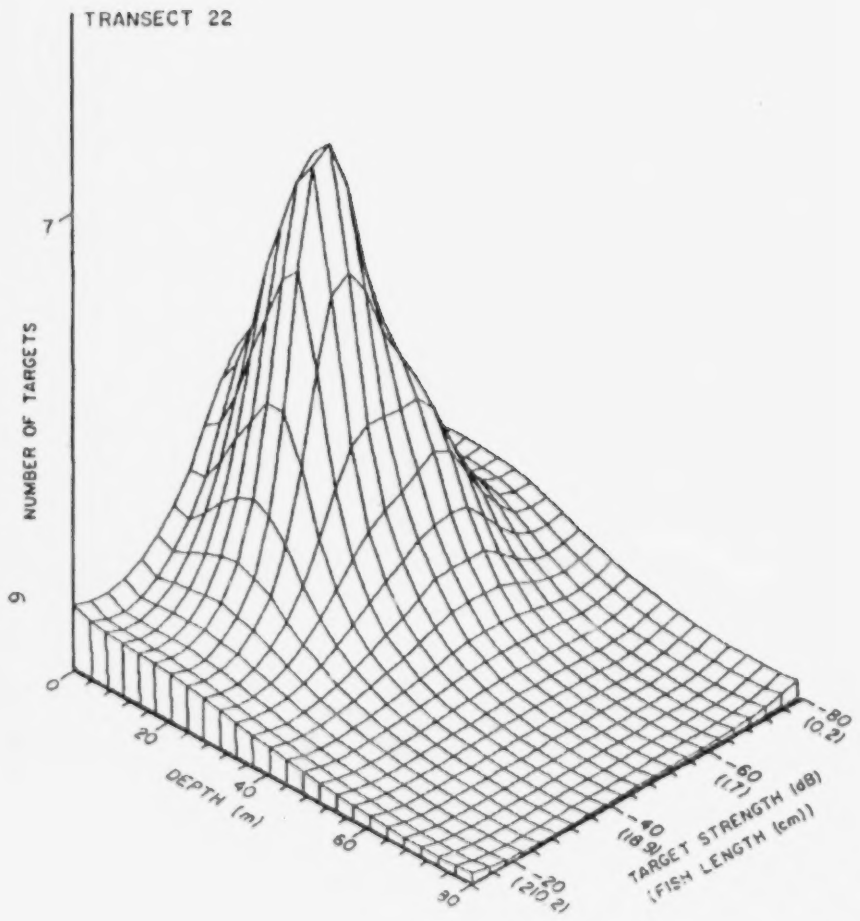

TRANSECT 5
NUMBER OF TARGETS
2
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

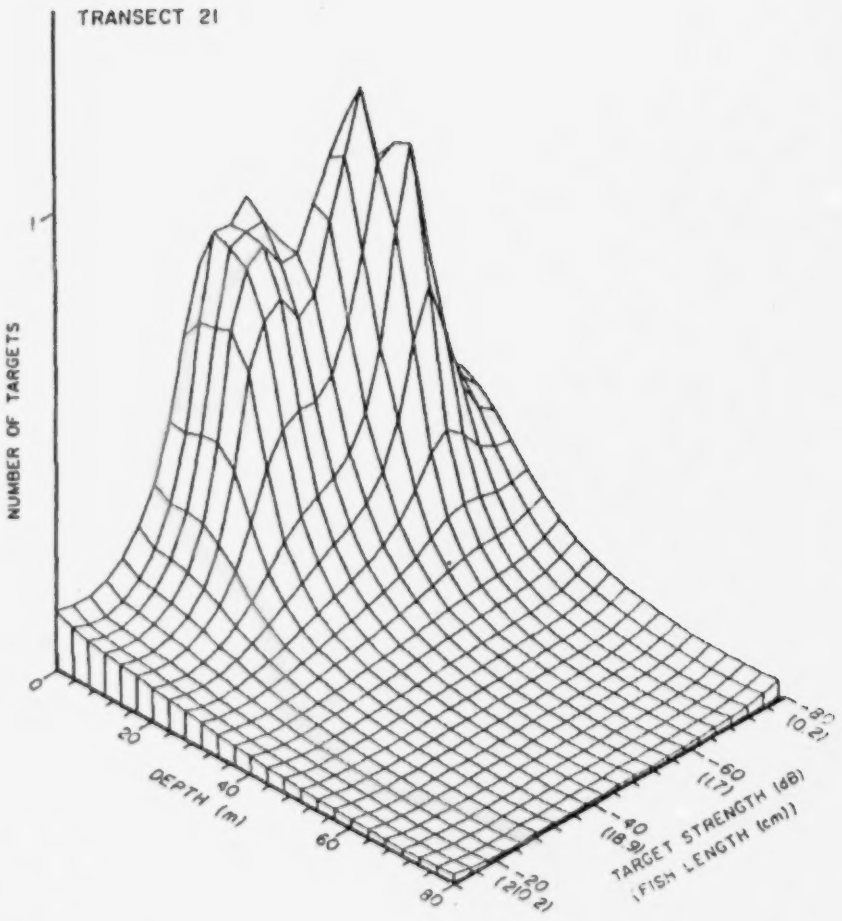

TRANSECT 16
NUMBER OF TARGETS
5
4
0
20
DEPTH (m)
40
60
80
-20
(-21.0 z)
-40
(-18.9)
-60
(-17)
-80
(-10 z)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

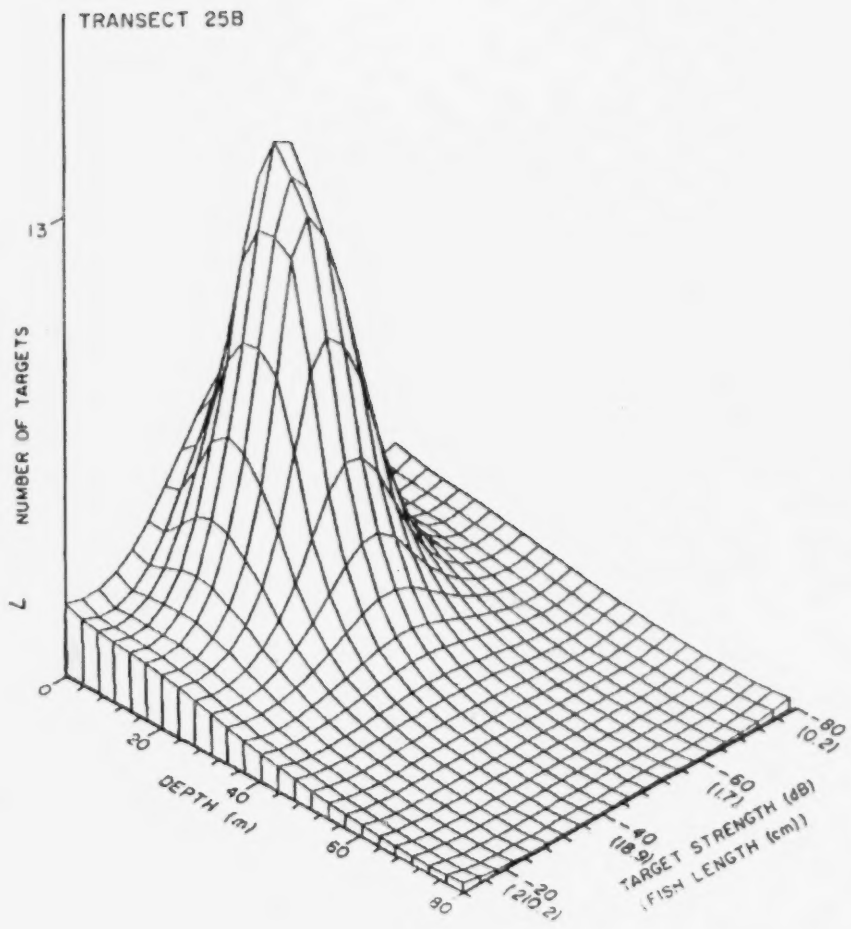

TRANSECT 10
NUMBER OF TARGETS
1
0
20
DEPTH (m)
40
60
80
-20
(-21.0 z)
-40
(-18.9)
-60
(-17)
-80
(-10 z)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

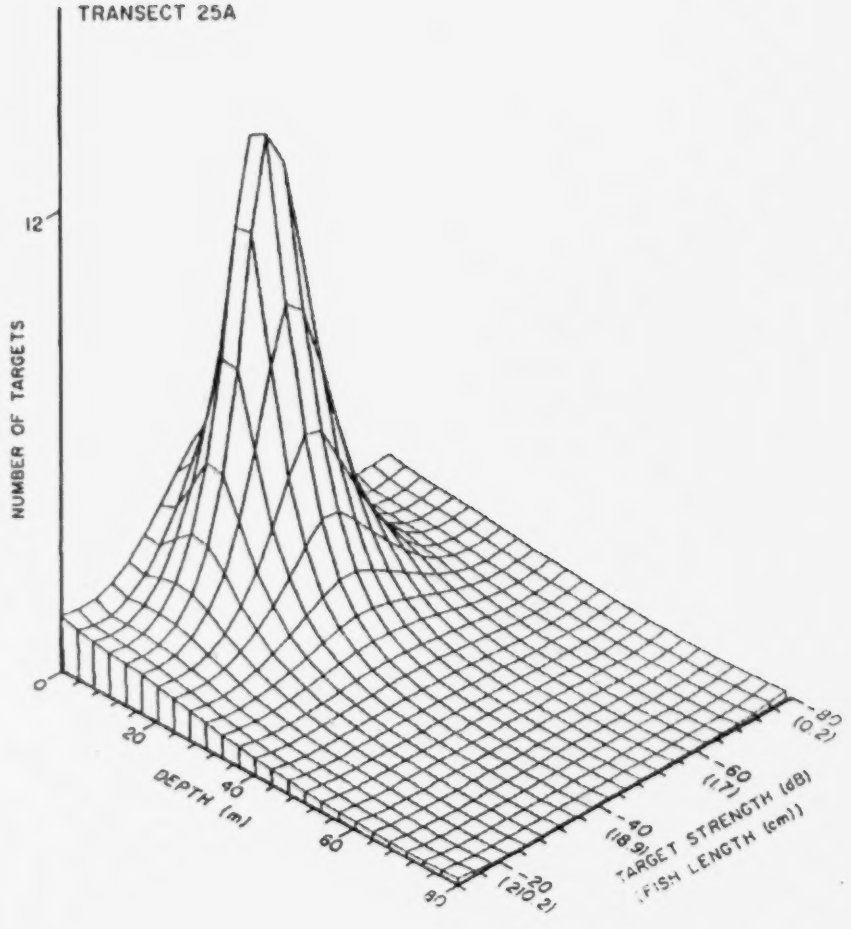

TRANSECT 20
7
5
NUMBER OF TARGETS
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(118.9)
-60
(1.7)
-60
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

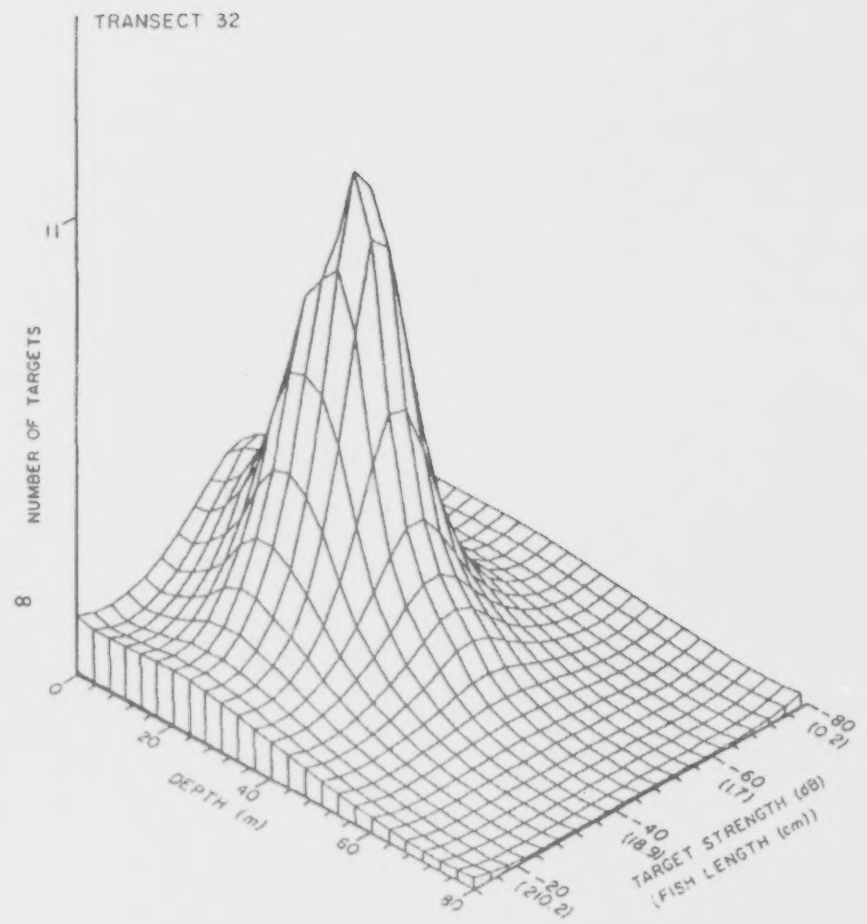

TRANSECT 18
14
NUMBER OF TARGETS
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(118.9)
-60
(1.7)
-60
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

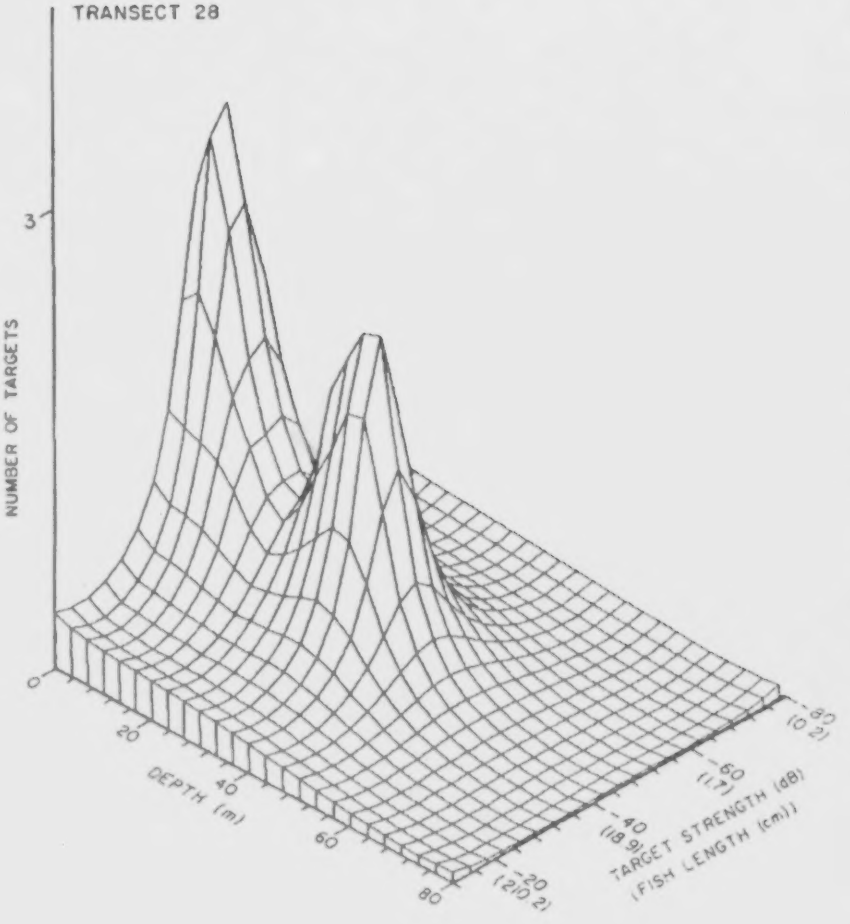

TRANSECT 22
NUMBER OF TARGETS
9
7
0
20
DEPTH (m)
40
60
80
-20
(21.2)
-40
(18.2)
-60
(17)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

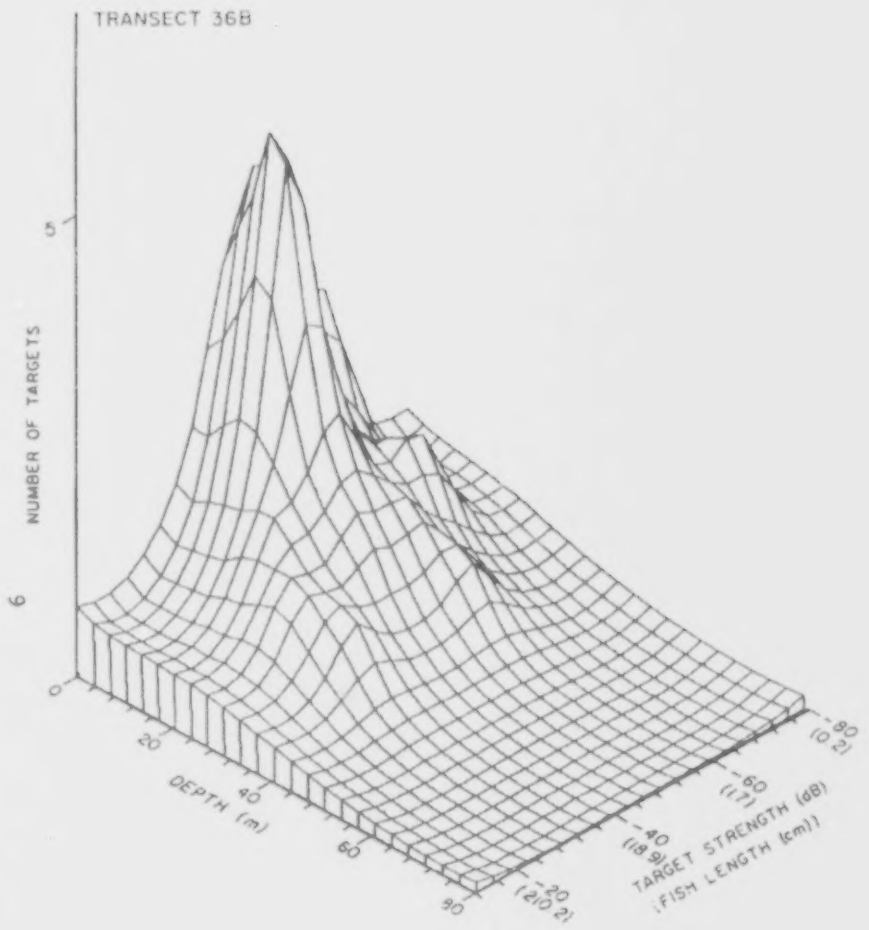

TRANSECT 21
NUMBER OF TARGETS
1
0
20
DEPTH (m)
40
60
80
-20
(21.2)
-40
(18.2)
-60
(17)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

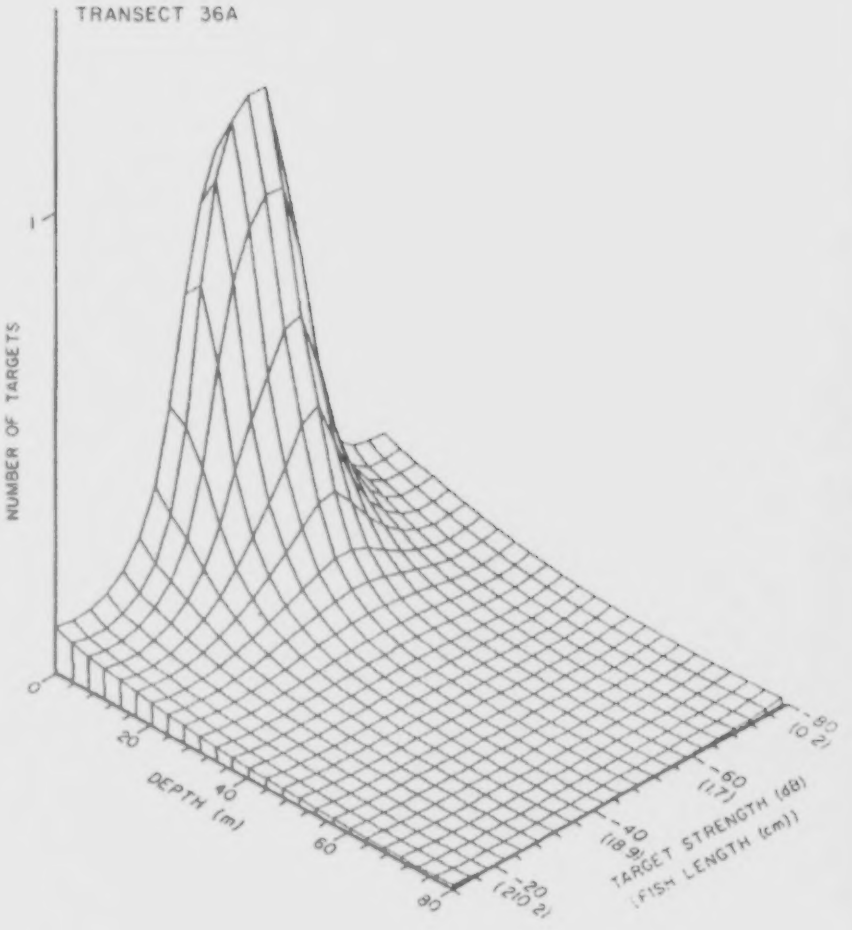

TRANSECT 25B
13
0
NUMBER OF TARGETS
20
40
60
80
DEPTH (m)
-20
(-210.2)
-40
(-18.9)
-60
(-1.7)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

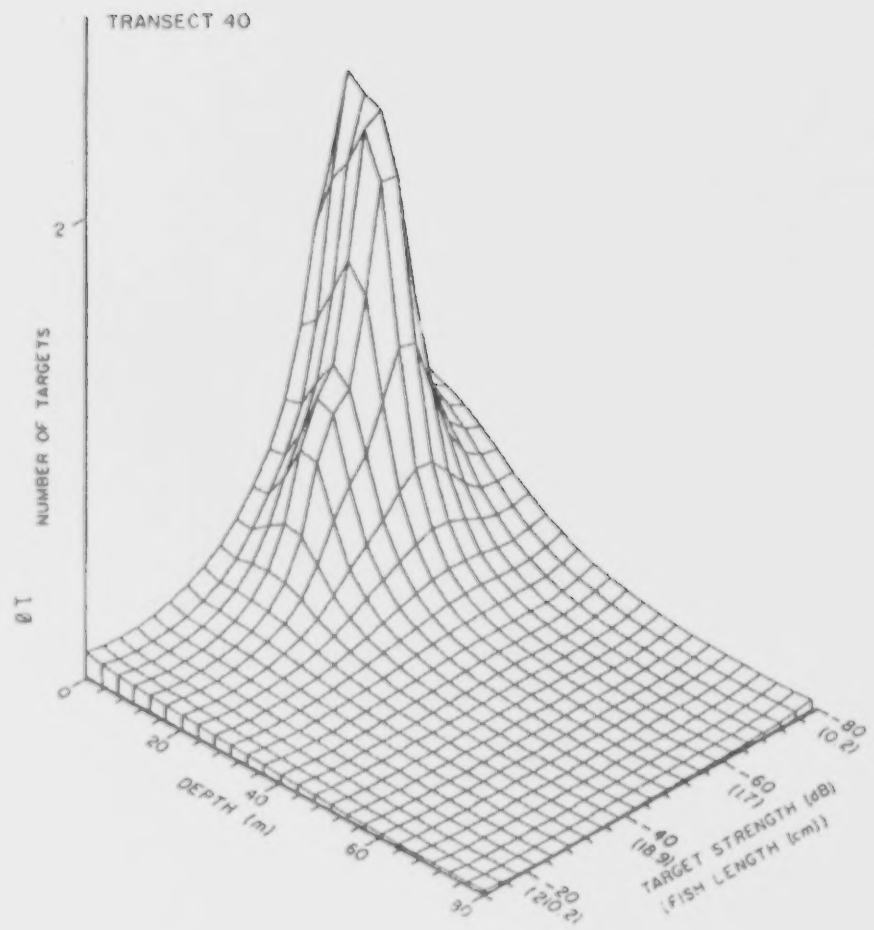

TRANSECT 25A
12
0
NUMBER OF TARGETS
20
40
60
80
DEPTH (m)
-20
(-210.2)
-40
(-18.9)
-60
(-1.7)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

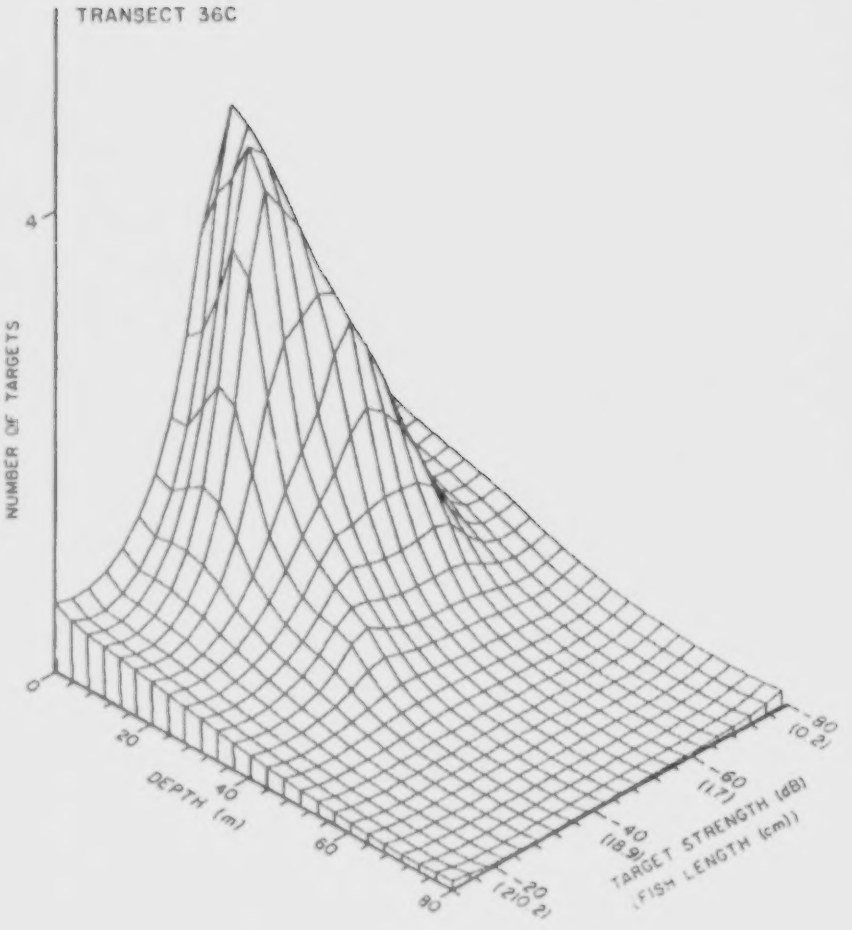

TRANSECT 32
11
8
NUMBER OF TARGETS
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(189)
-60
(17)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

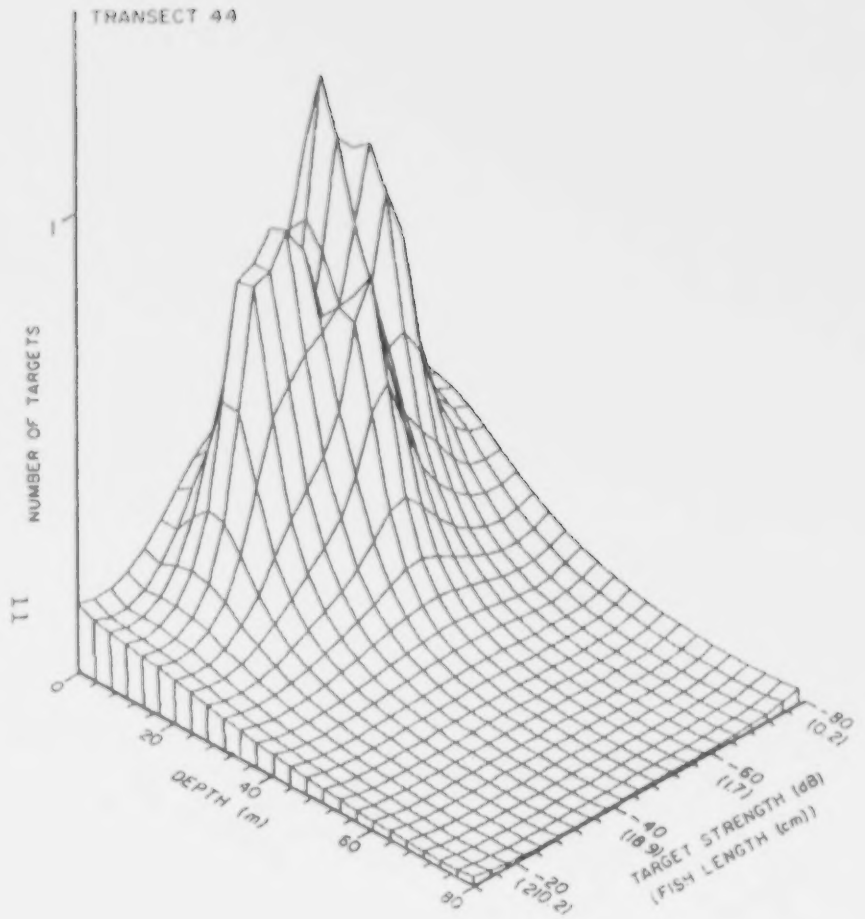

TRANSECT 28
3
NUMBER OF TARGETS
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(189)
-60
(17)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

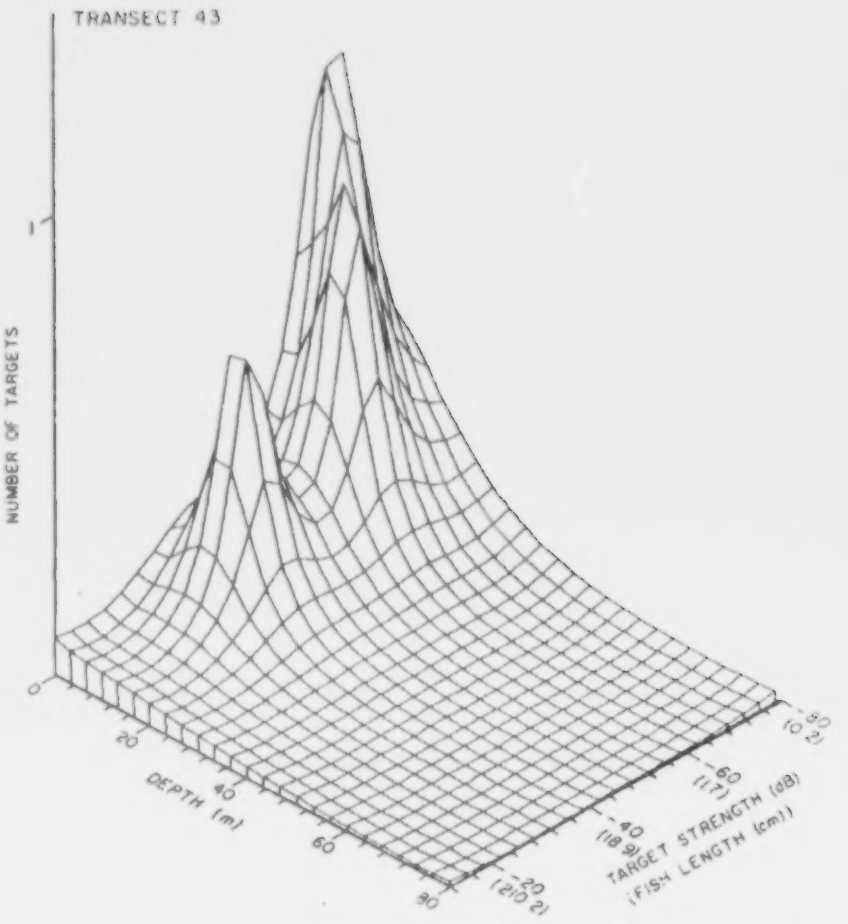

TRANSECT 36B
NUMBER OF TARGETS
6
5
0
20
DEPTH (m)
40
60
90
-20
(-210.2)
-40
(-18.9)
-60
(-1.7)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

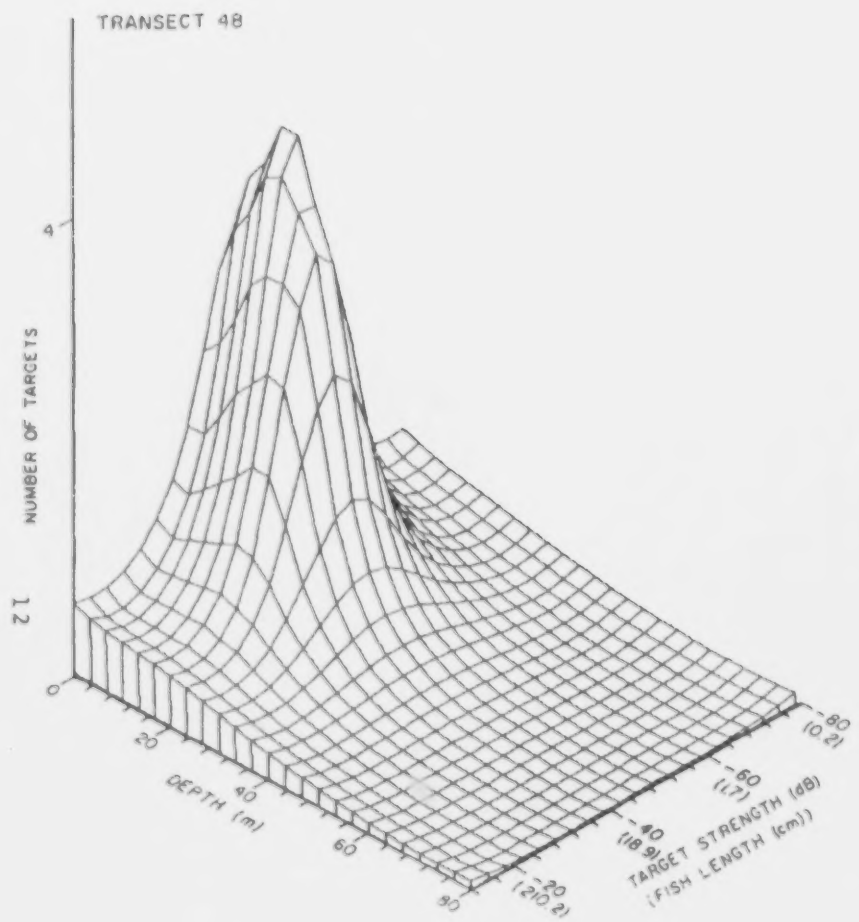

TRANSECT 36A
NUMBER OF TARGETS
1
0
20
DEPTH (m)
40
60
90
-20
(-210.2)
-40
(-18.9)
-60
(-1.7)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

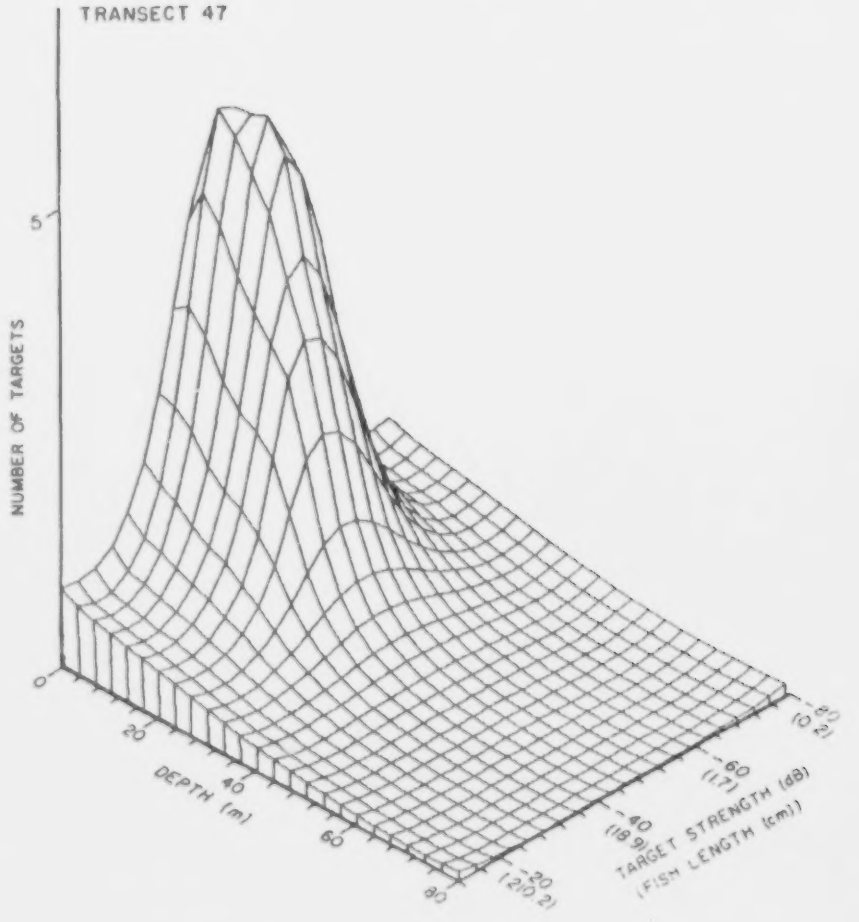

TRANSECT 40
NUMBER OF TARGETS
0
1.0
2
0
20
40
60
90
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

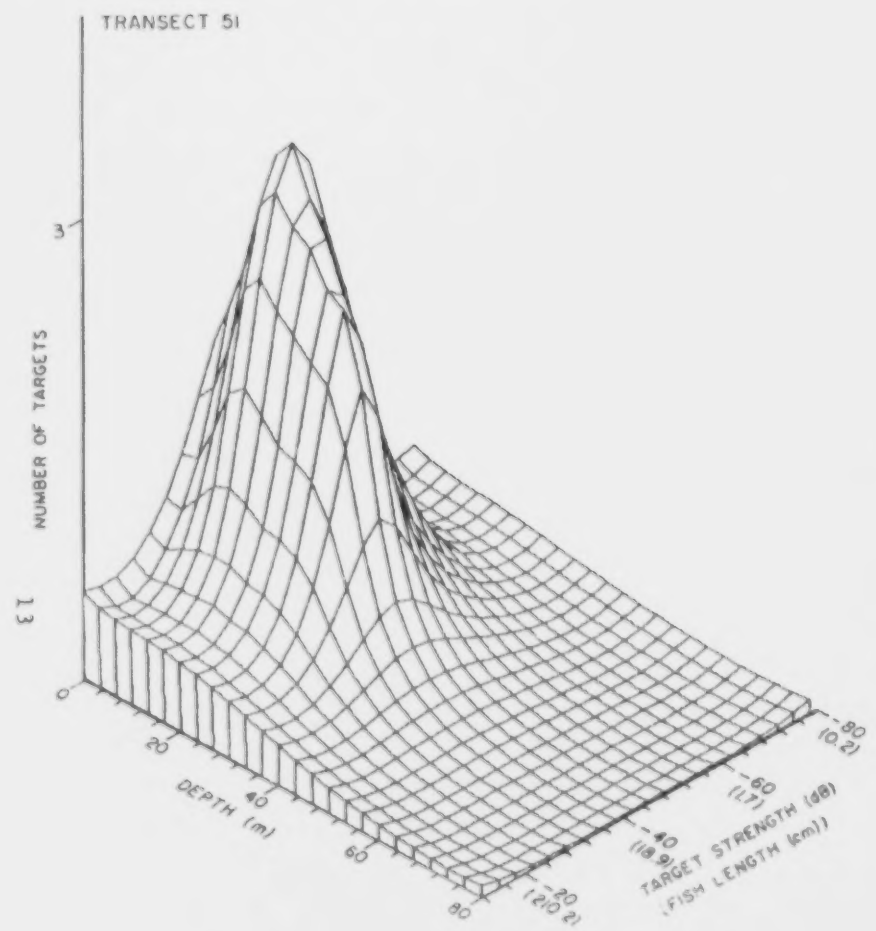

TRANSECT 36C
NUMBER OF TARGETS
0
4
0
20
40
60
90
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

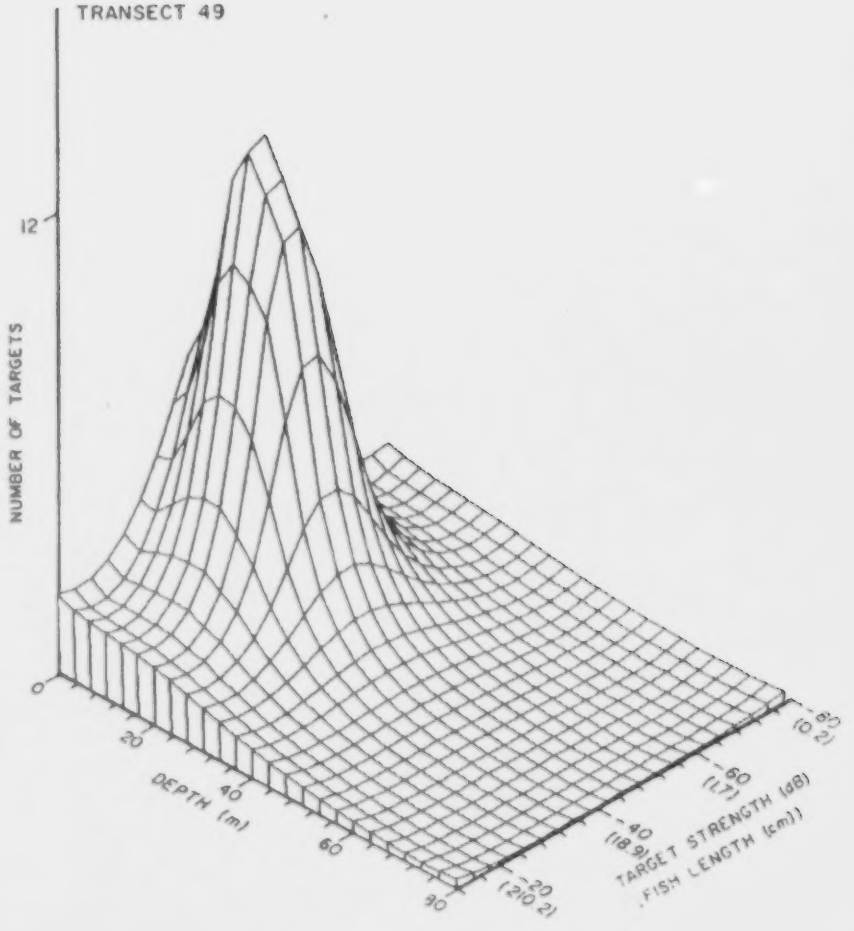

TRANSECT 44
NUMBER OF TARGETS
1
0
20
DEPTH (m)
40
60
80
-20
(21.2)
-40
(18.2)
-60
(1.7)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

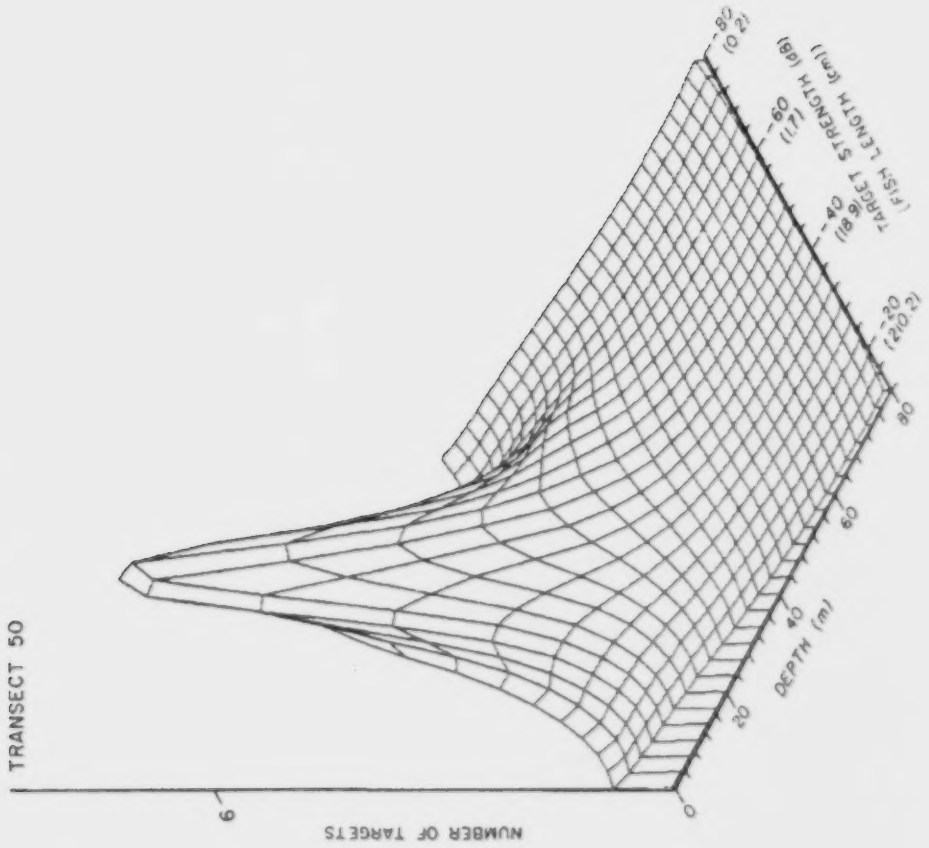

TRANSECT 43
NUMBER OF TARGETS
1
0
20
DEPTH (m)
40
60
80
-20
(21.2)
-40
(18.2)
-60
(1.7)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

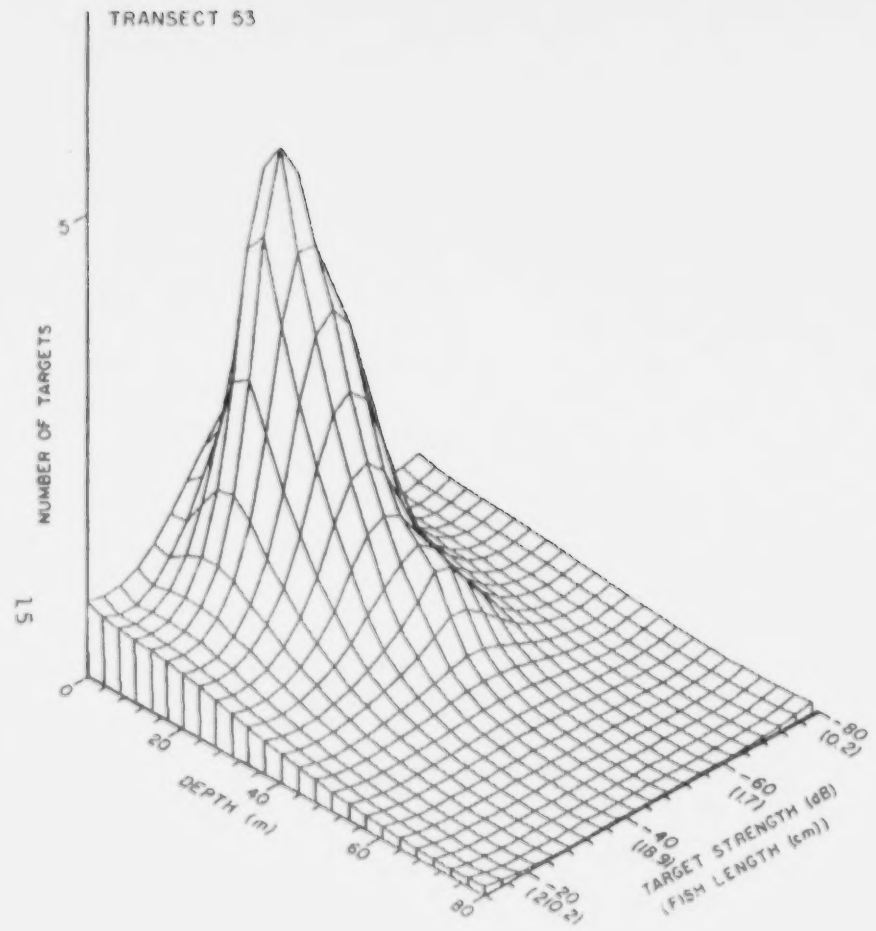

TRANSECT 48
NUMBER OF TARGETS
12
4
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(10.2)

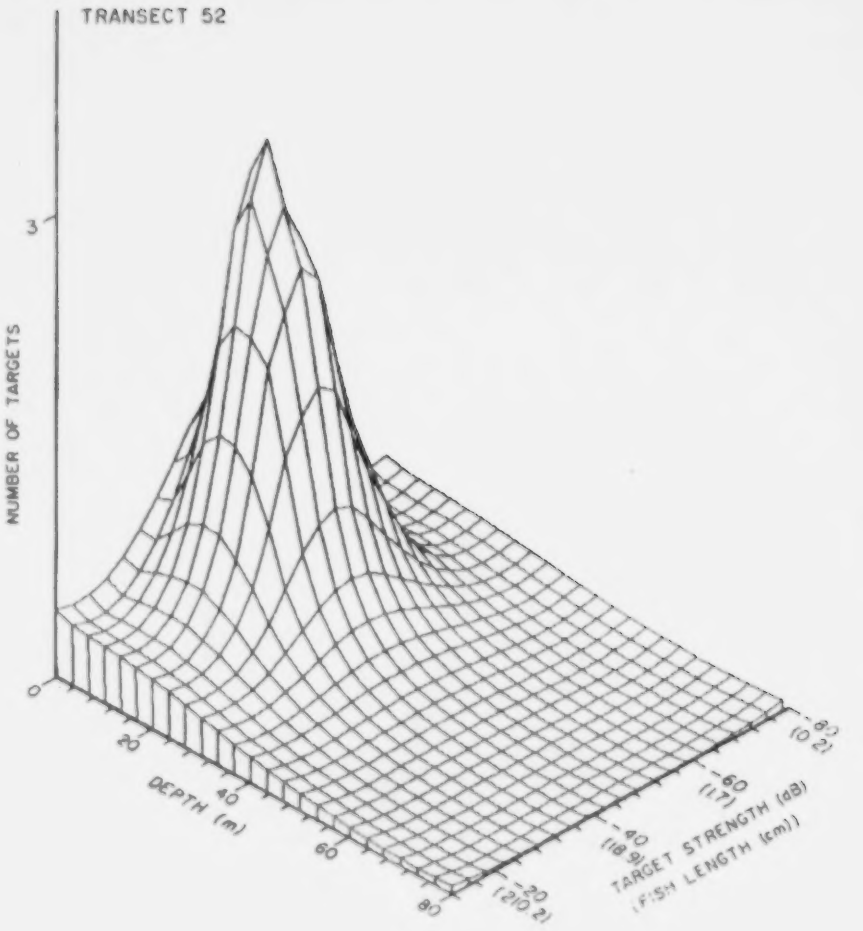

TRANSECT 47
NUMBER OF TARGETS
5
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(10.2)

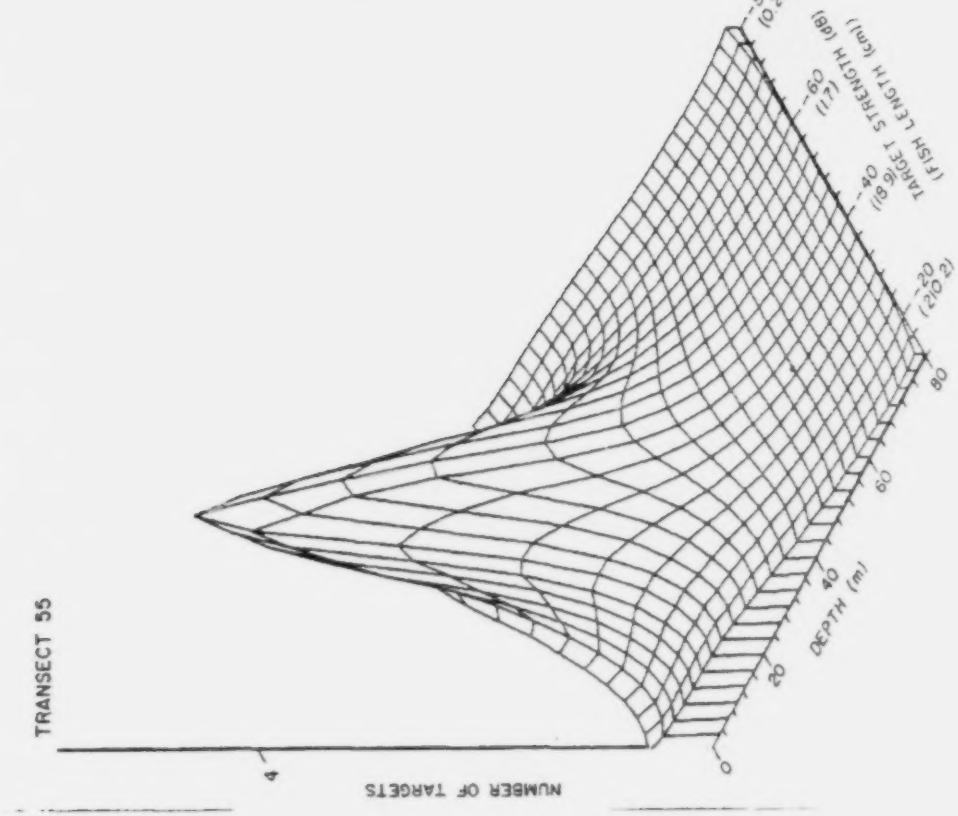

TRANSECT 51
NUMBER OF TARGETS
3
0
13
20
40
60
80
DEPTH (m)
-90
(10.2)
-60
(1.7)
-40
(18.9)
-20
(210.2)
TARGET STRENGTH (dB)
FISH LENGTH (cm))

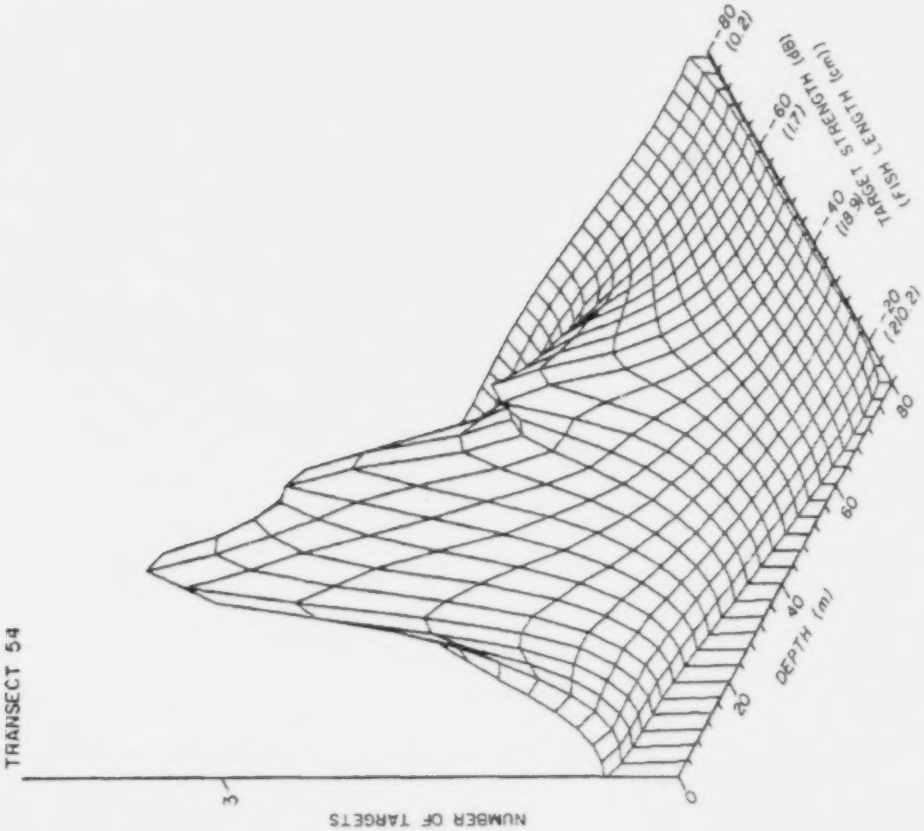

TRANSECT 49
NUMBER OF TARGETS
12
0
20
40
60
80
DEPTH (m)
-90
(10.2)
-60
(1.7)
-40
(18.9)
-20
(210.2)
TARGET STRENGTH (dB)
FISH LENGTH (cm))

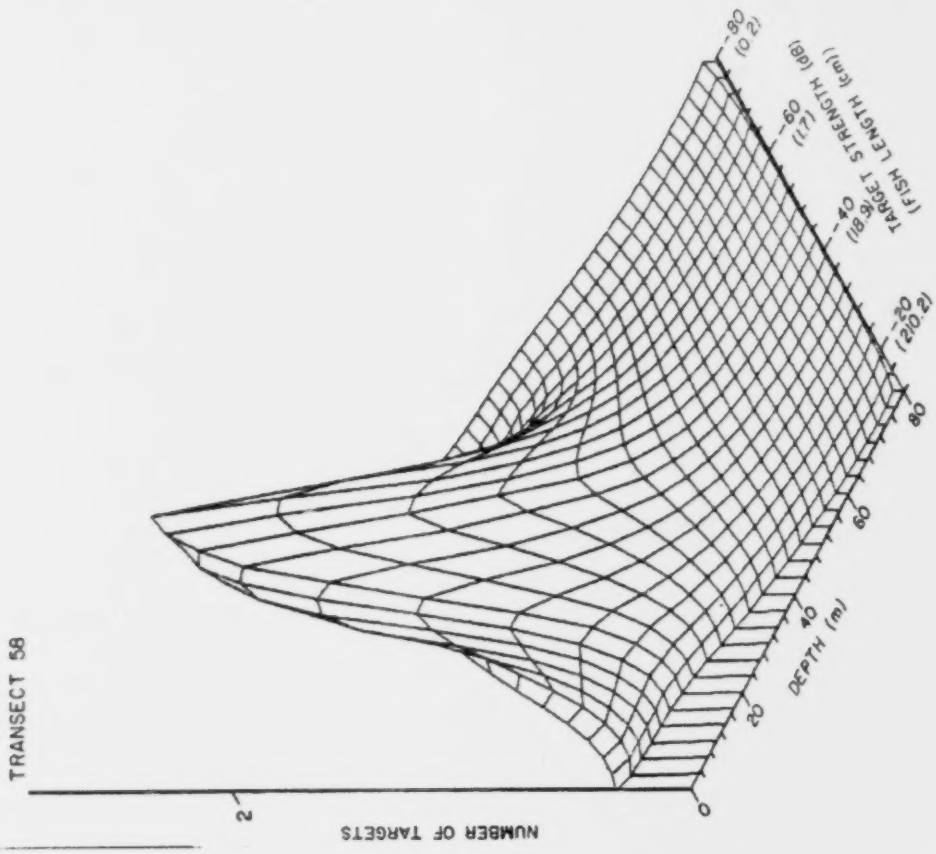

TRANSECT 50
NUMBER OF TARGETS
0
6
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (10.2)
-60 (1.7)
-40 (18.6)
-20 (210.2)

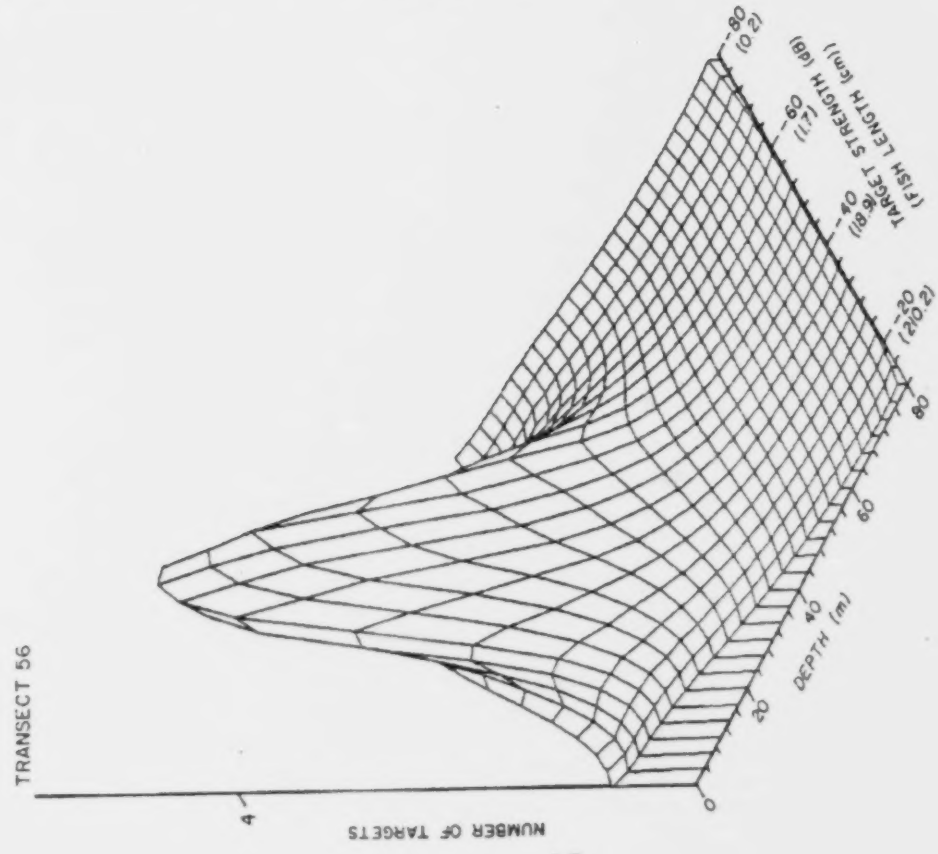

TRANSECT 53
NUMBER OF TARGETS
15
5
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

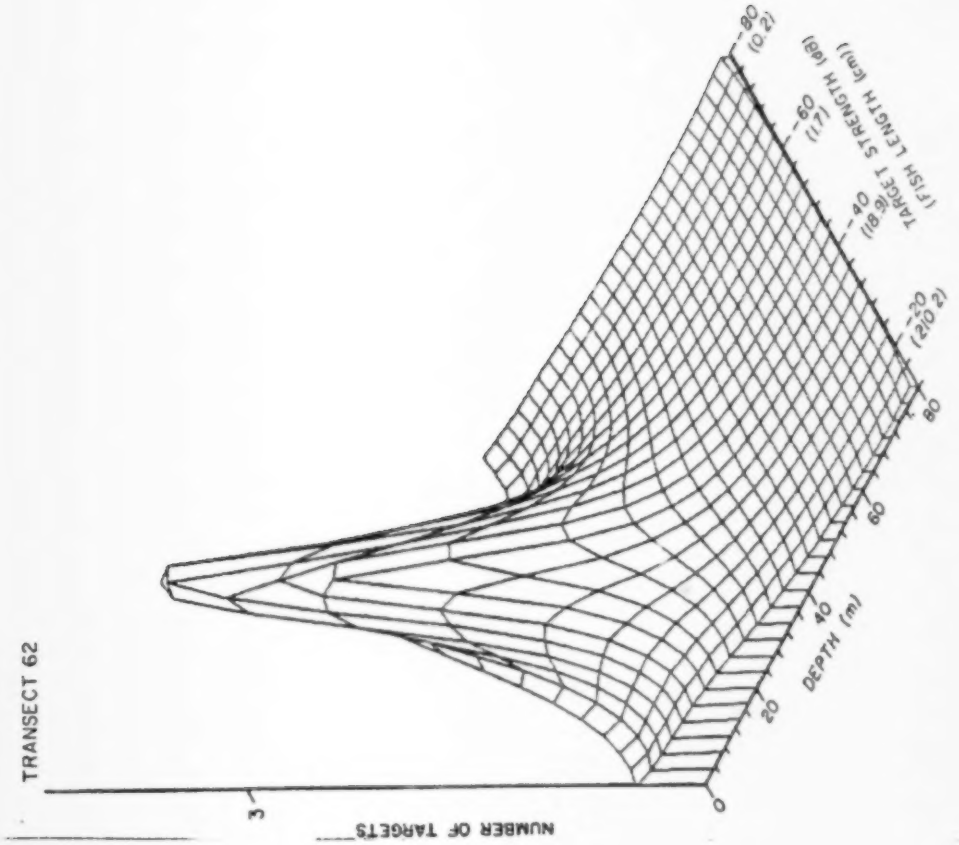

TRANSECT 52
NUMBER OF TARGETS
3
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

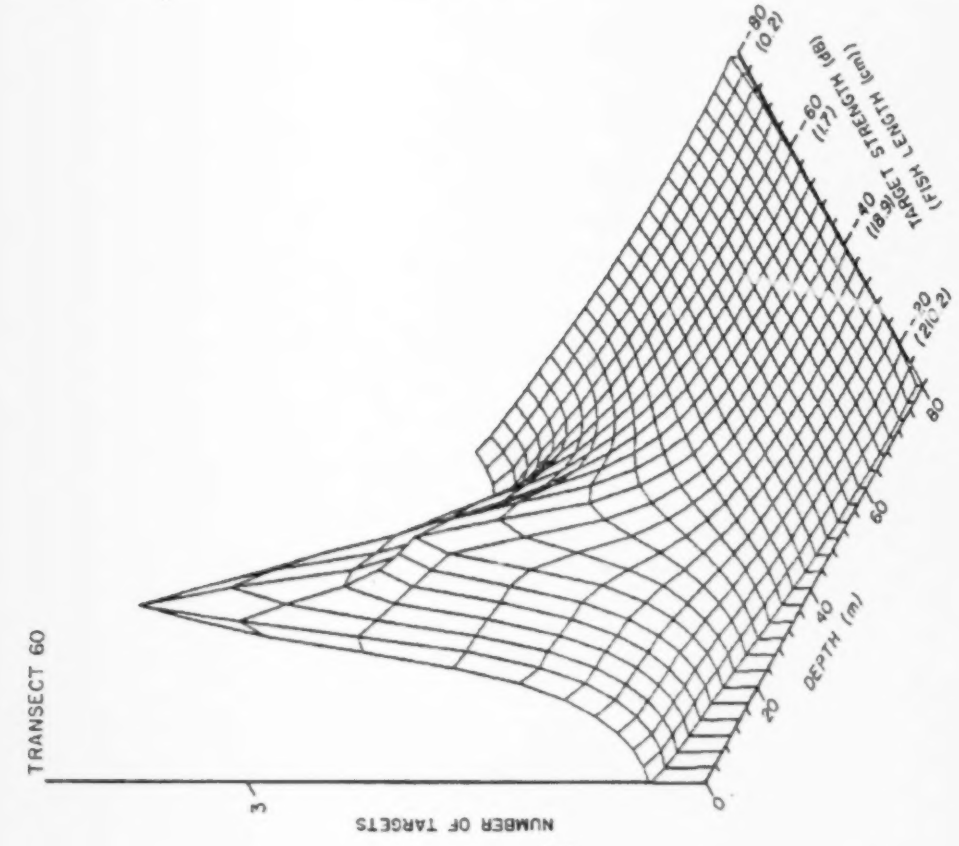

TRANSECT 55
NUMBER OF TARGETS
4
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-20 (20.2)
-40 (6.8)
-60 (1.7)
-80 (0.2)

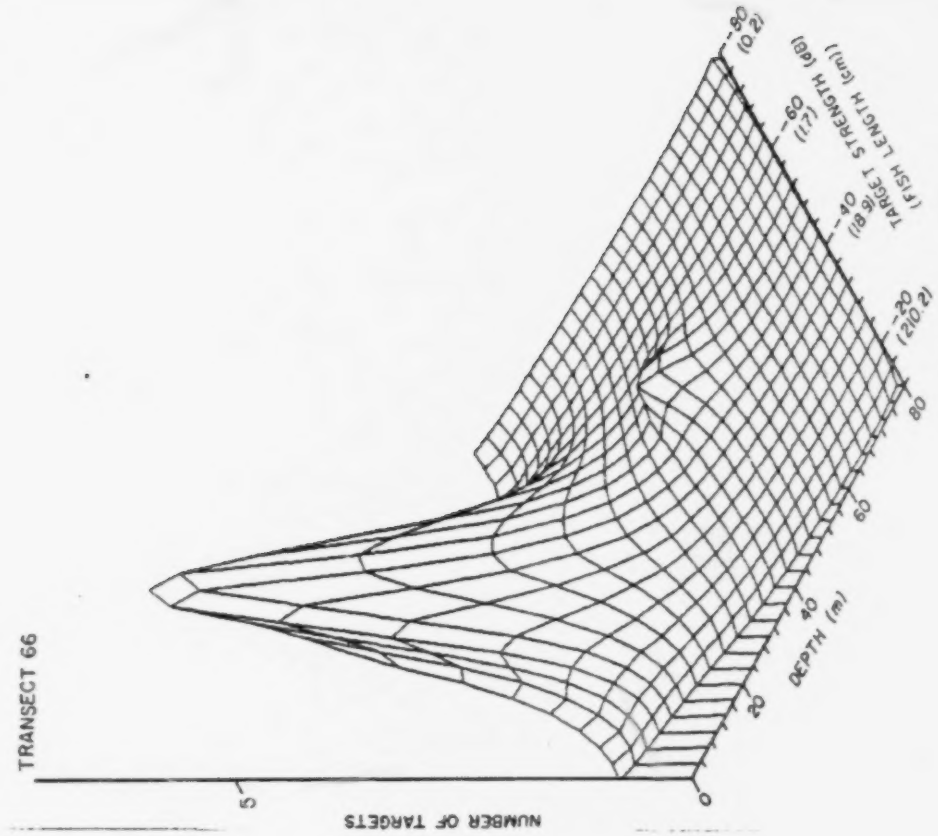

TRANSECT 54
NUMBER OF TARGETS
3
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-20 (20.2)
-40 (6.8)
-60 (1.7)
-80 (0.2)

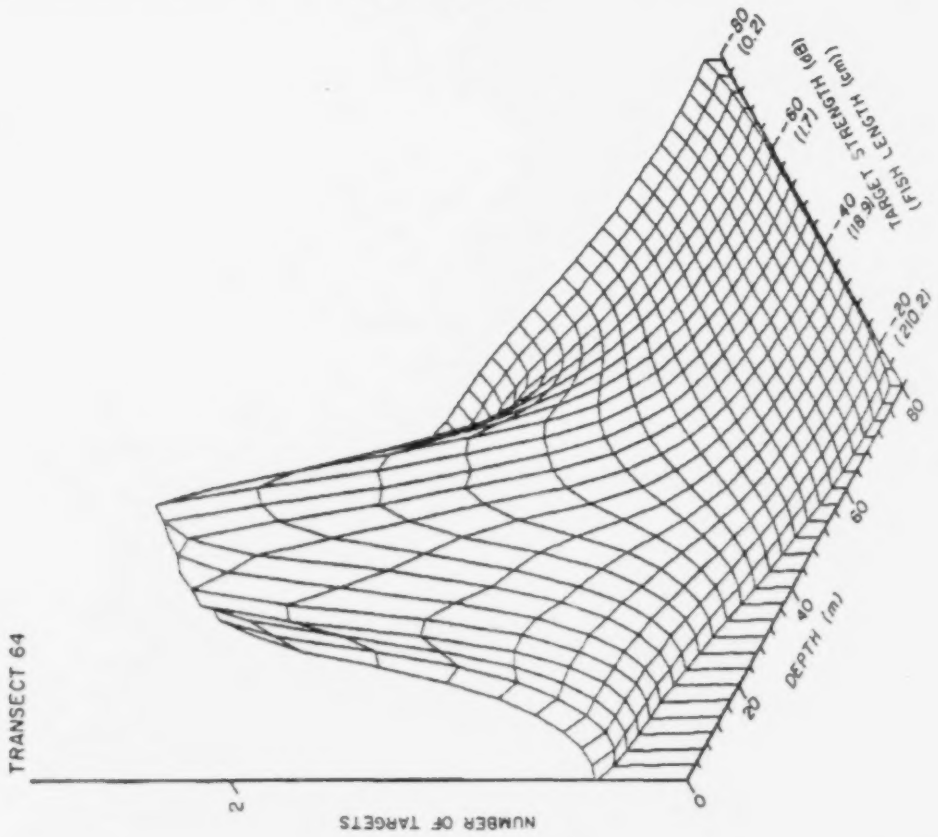

TRANSECT 58
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
-20 (20.2)
-40 (8.8)
-60 (1.7)
-80 (0.2)
TARGET STRENGTH (dB)
FISH LENGTH (cm)

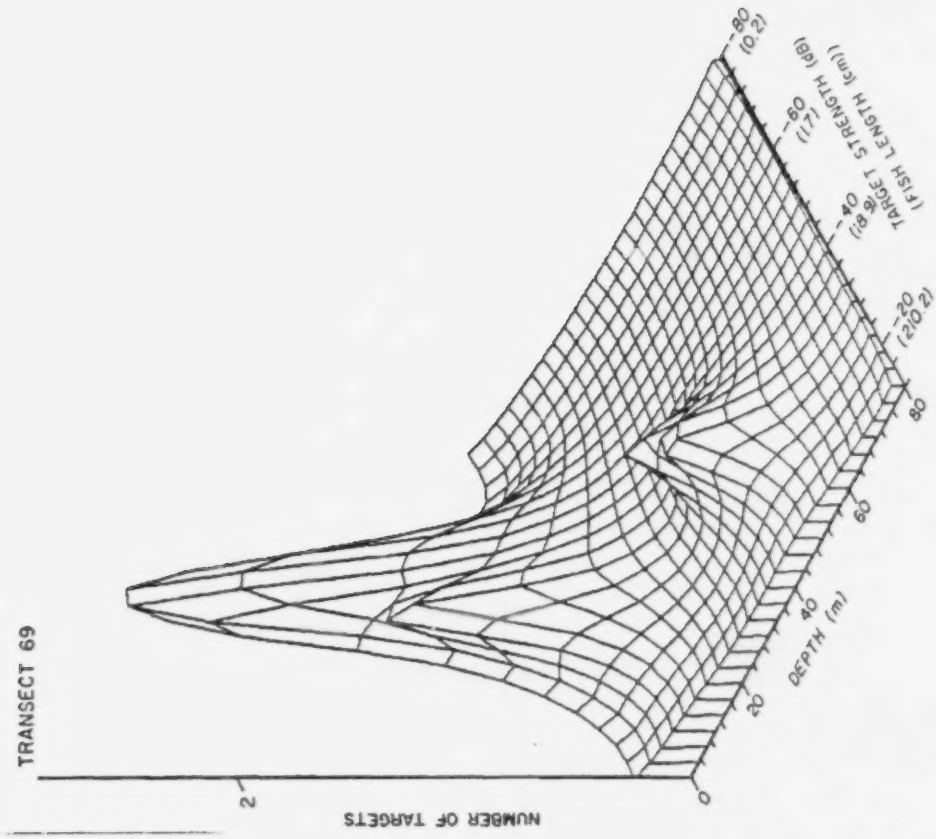

TRANSECT 56
NUMBER OF TARGETS
4
0
DEPTH (m)
20
40
60
80
-20 (20.2)
-40 (8.8)
-60 (1.7)
-80 (0.2)
TARGET STRENGTH (dB)
FISH LENGTH (cm)

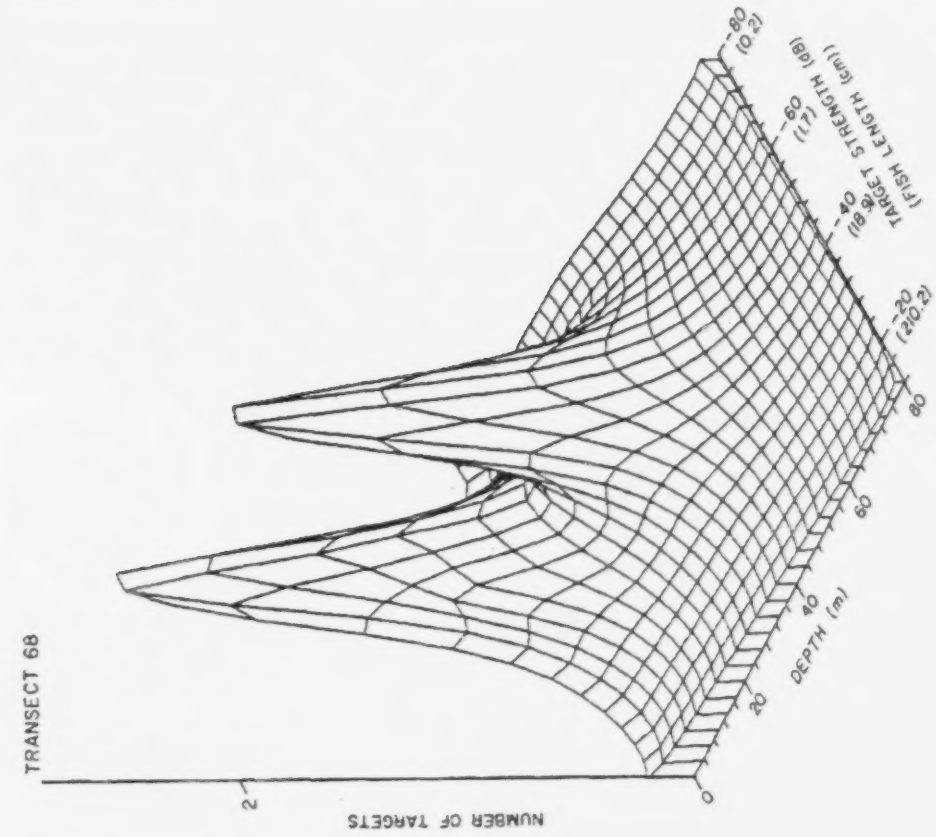

TRANSECT 62
NUMBER OF TARGETS
3
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (8.9)
-20 (21.2)


TRANSECT 60
NUMBER OF TARGETS
3
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (8.9)
-20 (21.2)

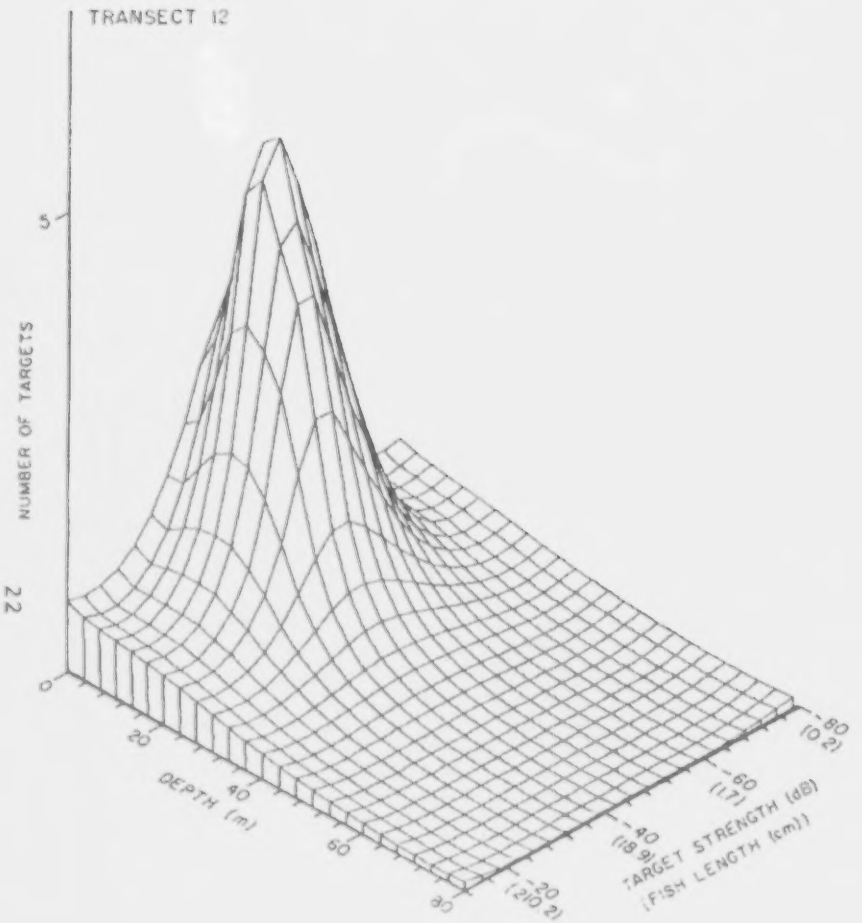

TRANSECT 66
NUMBER OF TARGETS
5
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (18.9)
-60 (1.7)
-80 (0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

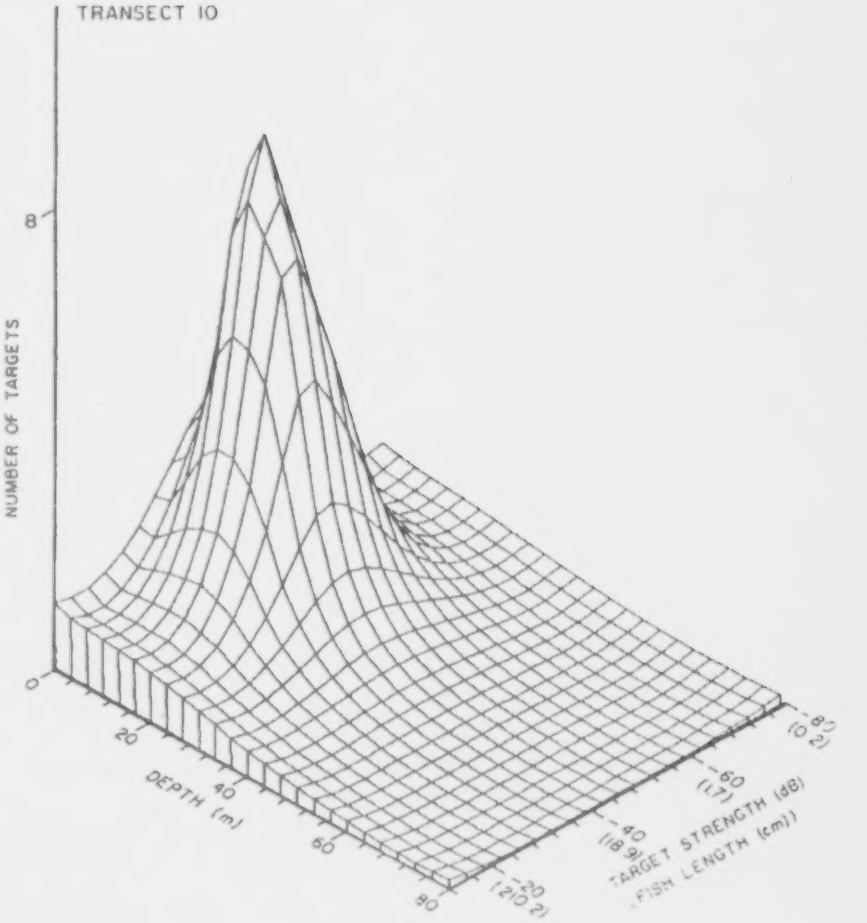

TRANSECT 64
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (18.9)
-60 (1.7)
-80 (0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

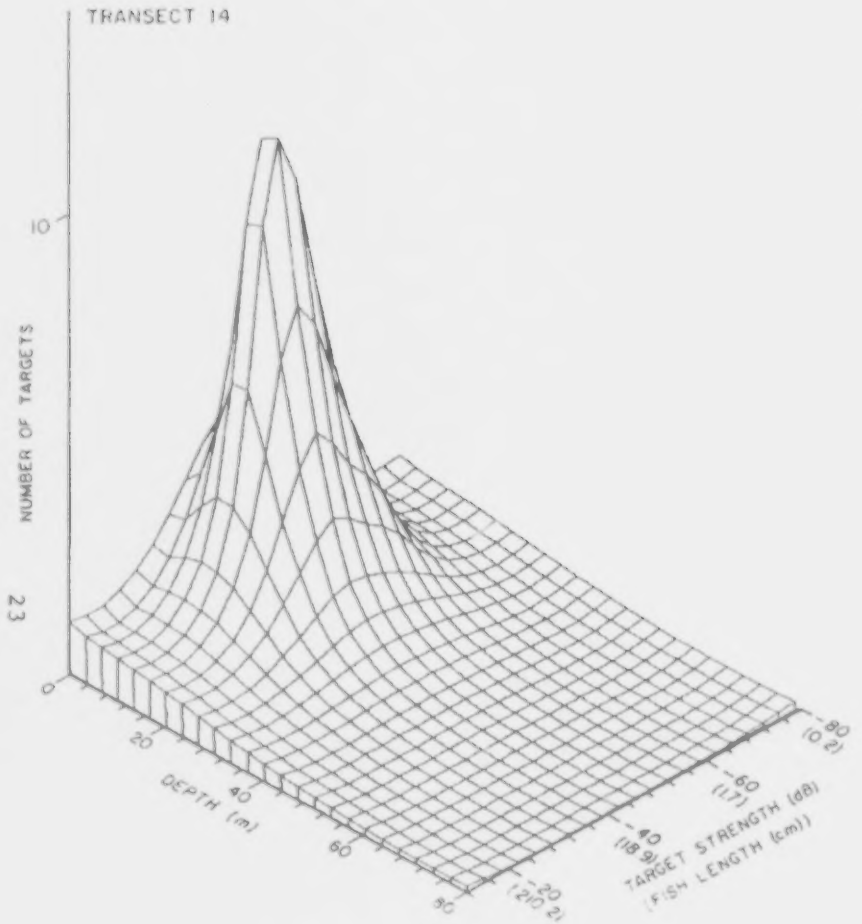

TRANSECT 69
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.8)
-20 (210.2)

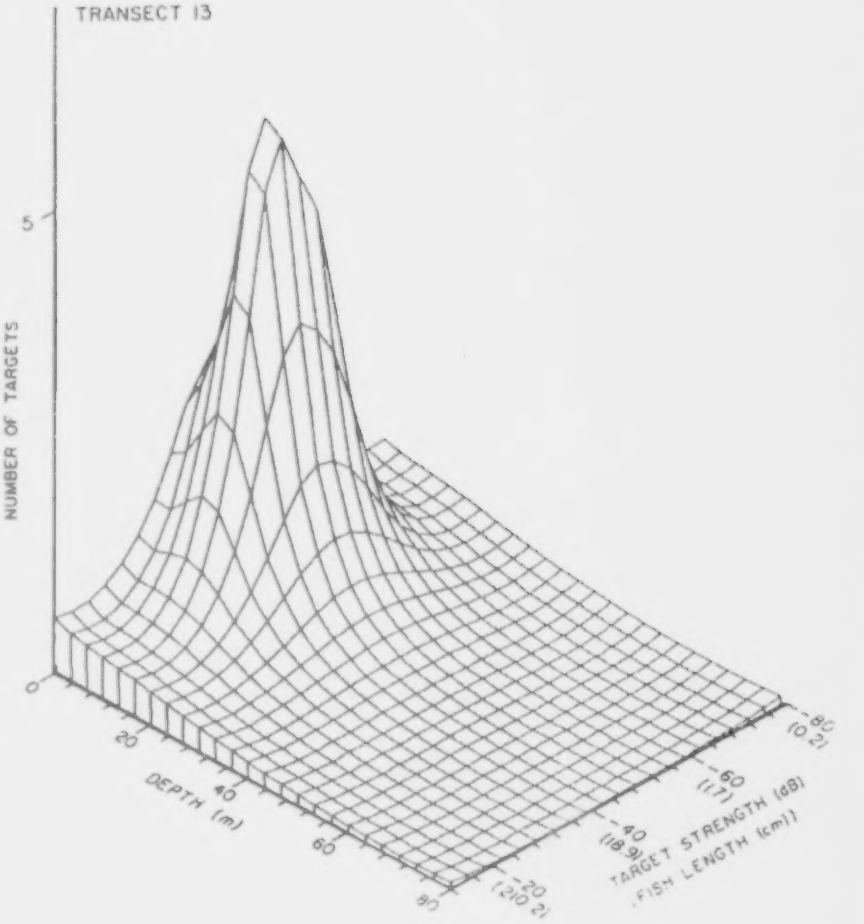

TRANSECT 68
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.8)
-20 (210.2)

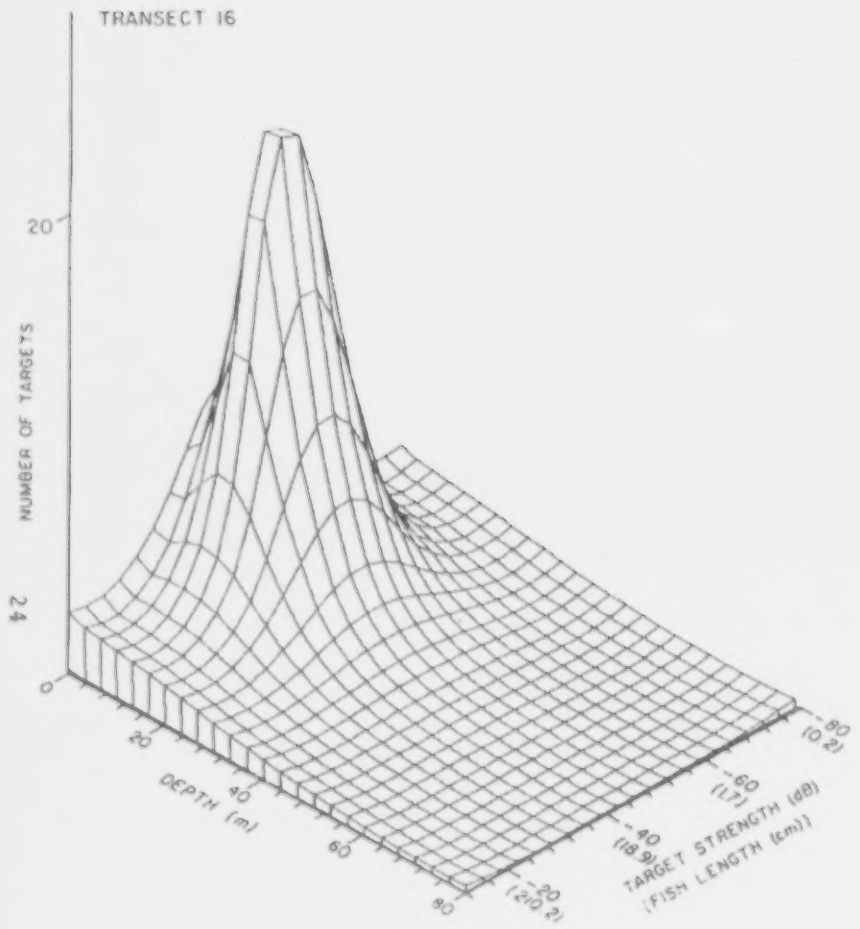
6.6.2 - Appendix F2 - September 1988

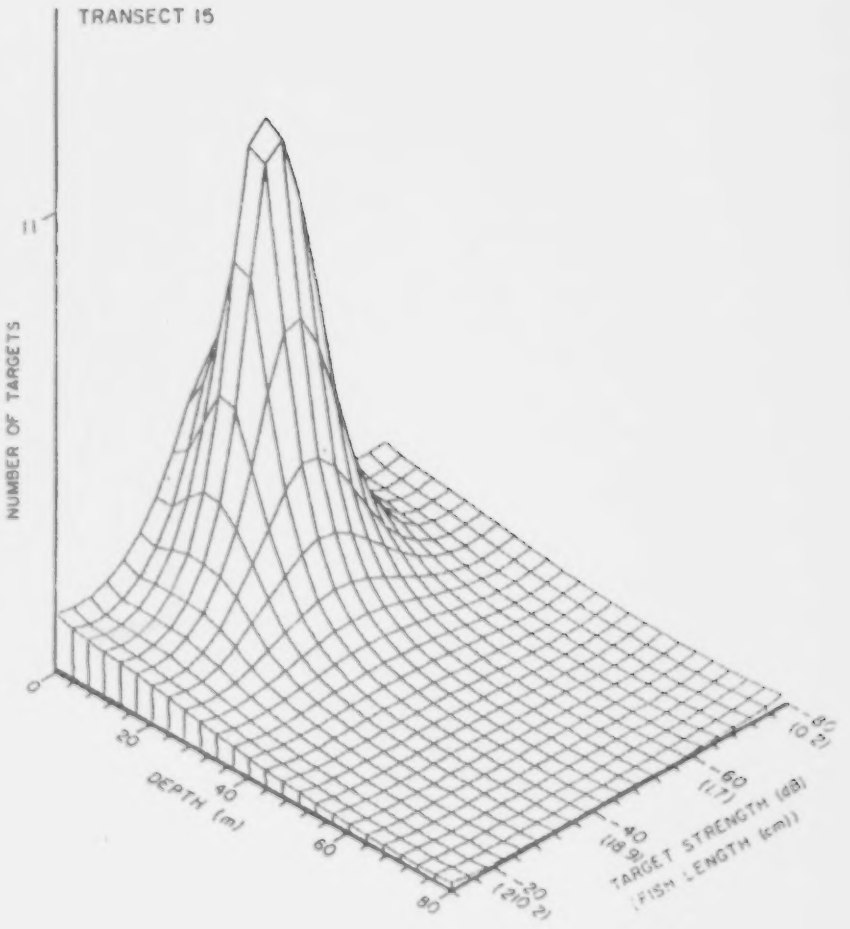

TRANSECT 12
NUMBER OF TARGETS
22
5
0
20
DEPTH (m)
40
60
80
-30
(-21.0 2)
-40
(-18.9)
-60
(-17)
-80
(-10 2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

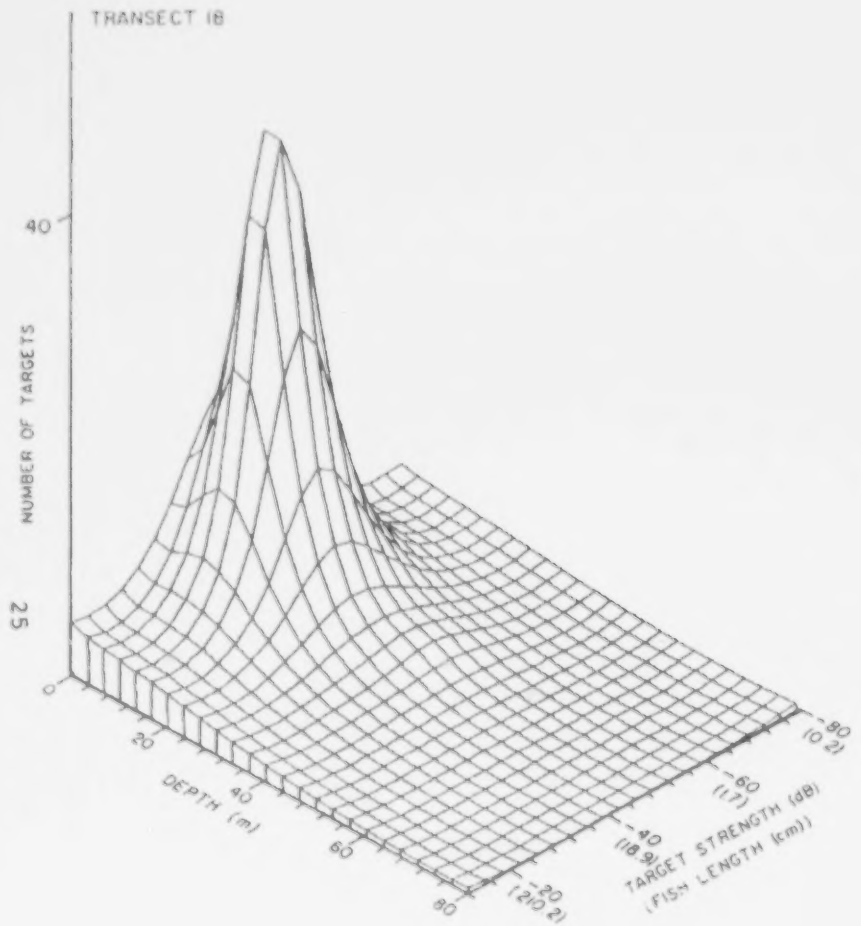

TRANSECT 10
NUMBER OF TARGETS
8
0
20
DEPTH (m)
40
60
80
-30
(-21.0 2)
-40
(-18.9)
-60
(-17)
-80
(-10 2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

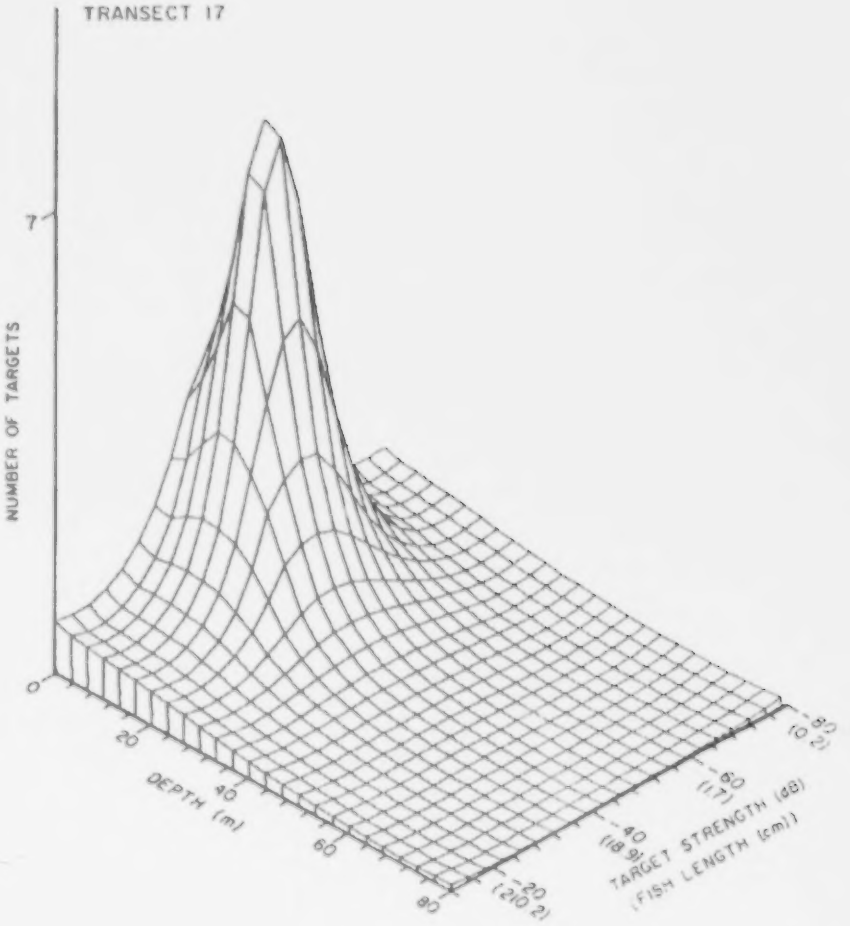

TRANSECT 14
NUMBER OF TARGETS
10
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (118.9)
-60 (11.7)
-80 (10.2)
TARGET STRENGTH (dB)
FISH LENGTH (cm)

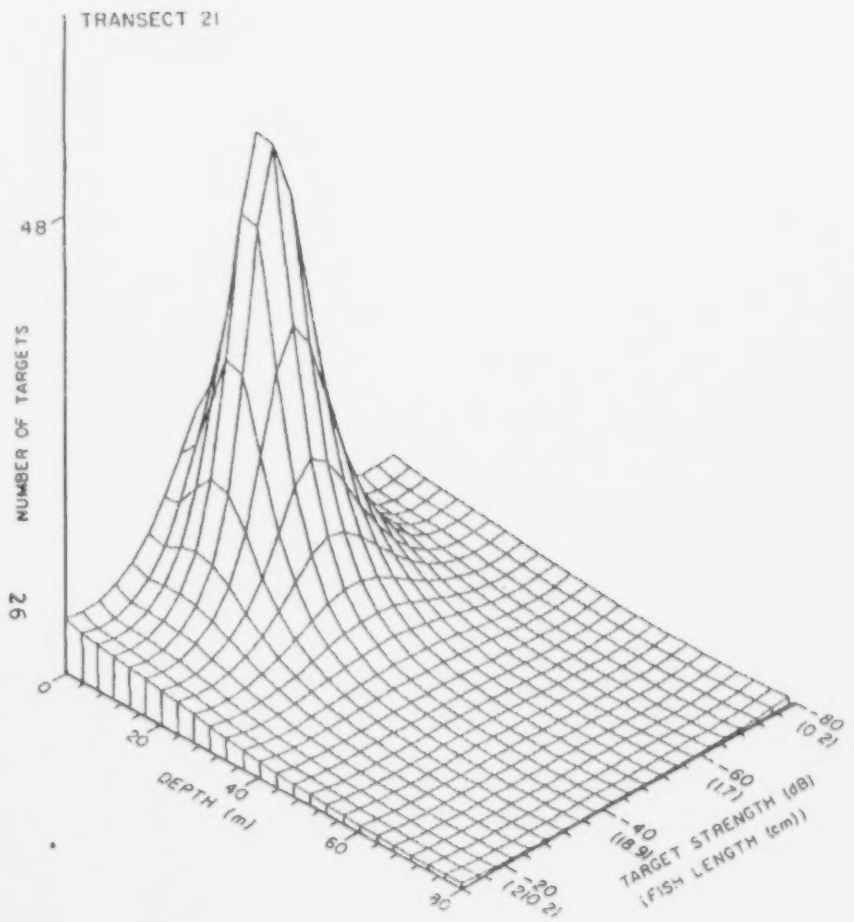

TRANSECT 13
NUMBER OF TARGETS
5
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (118.9)
-60 (11.7)
-80 (10.2)
TARGET STRENGTH (dB)
FISH LENGTH (cm)

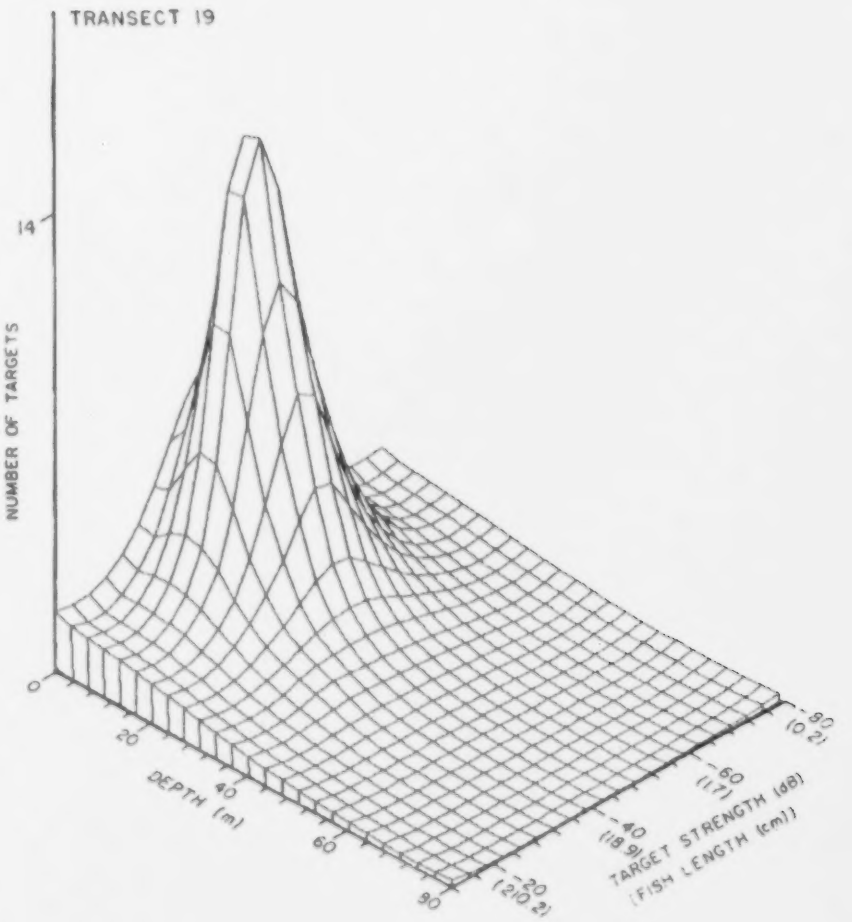

TRANSECT 16
NUMBER OF TARGETS
20
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)

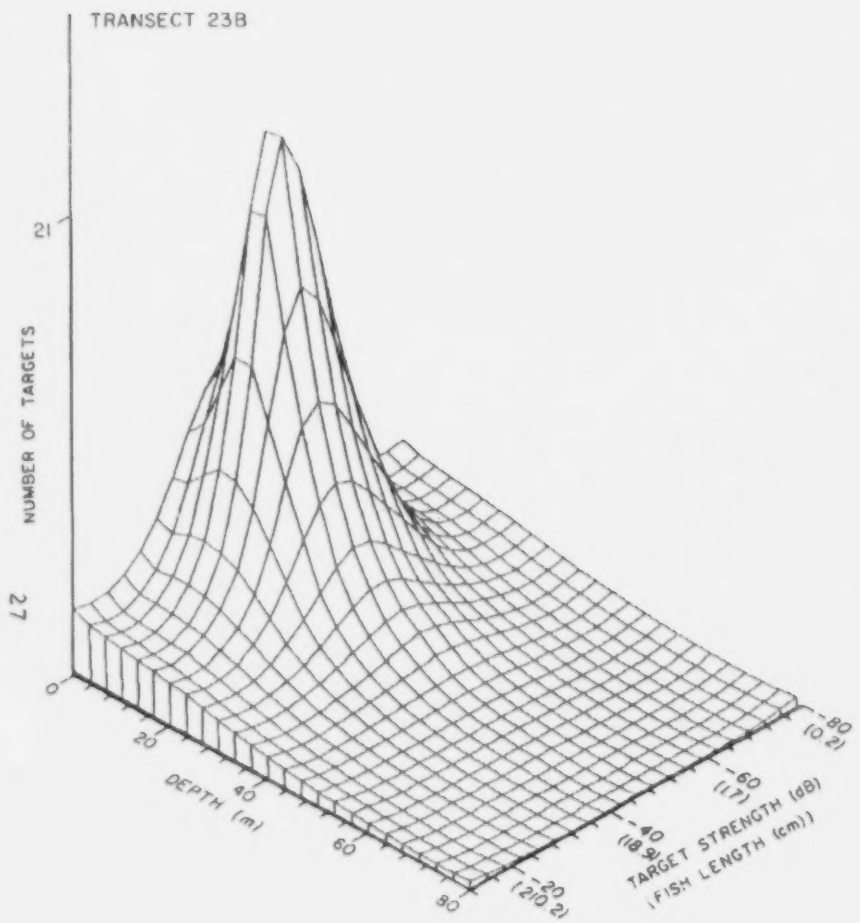

TRANSECT 15
NUMBER OF TARGETS
11
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)

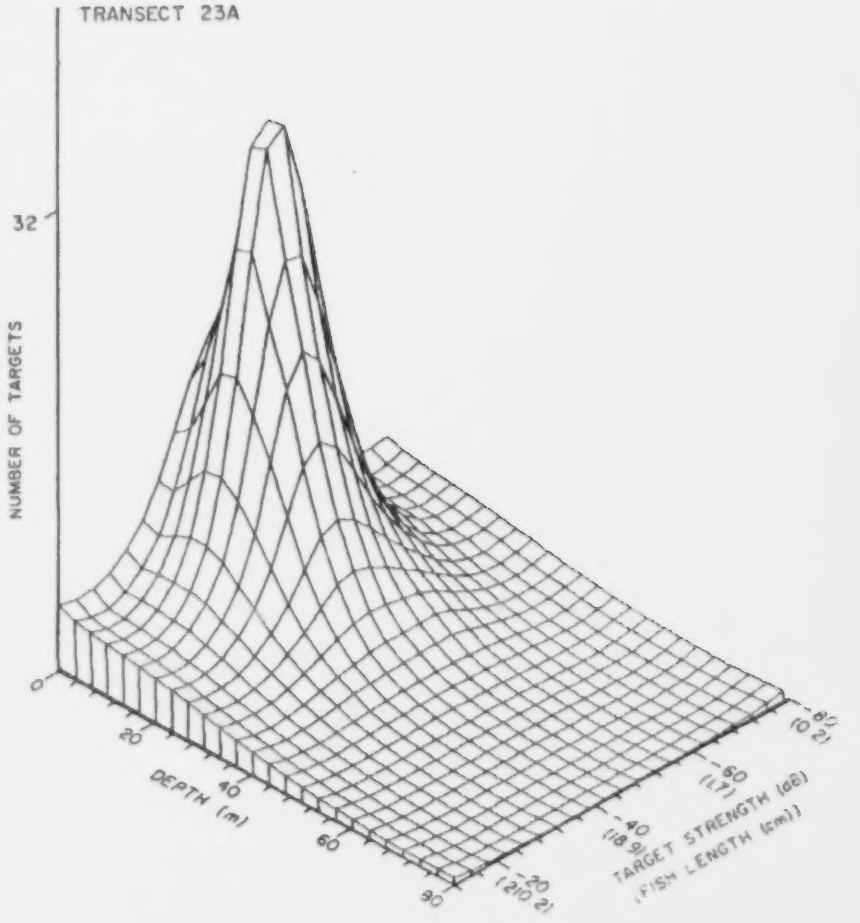

TRANSECT 18
NUMBER OF TARGETS
40
25
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(17)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

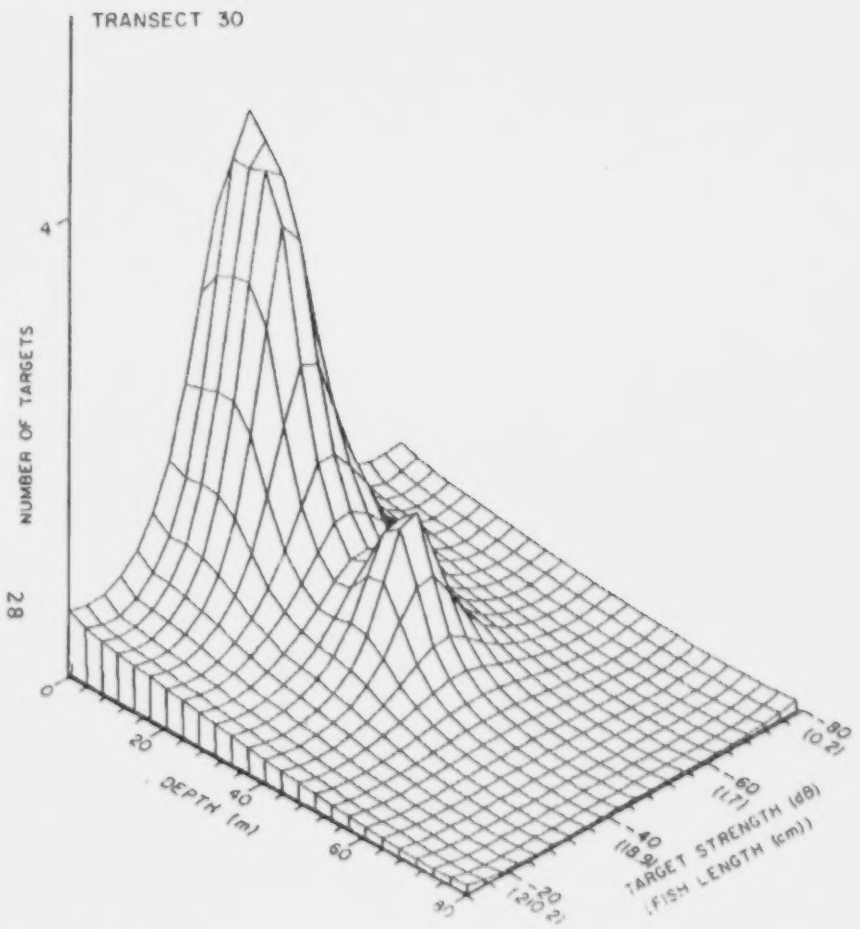

TRANSECT 17
NUMBER OF TARGETS
7
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(17)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

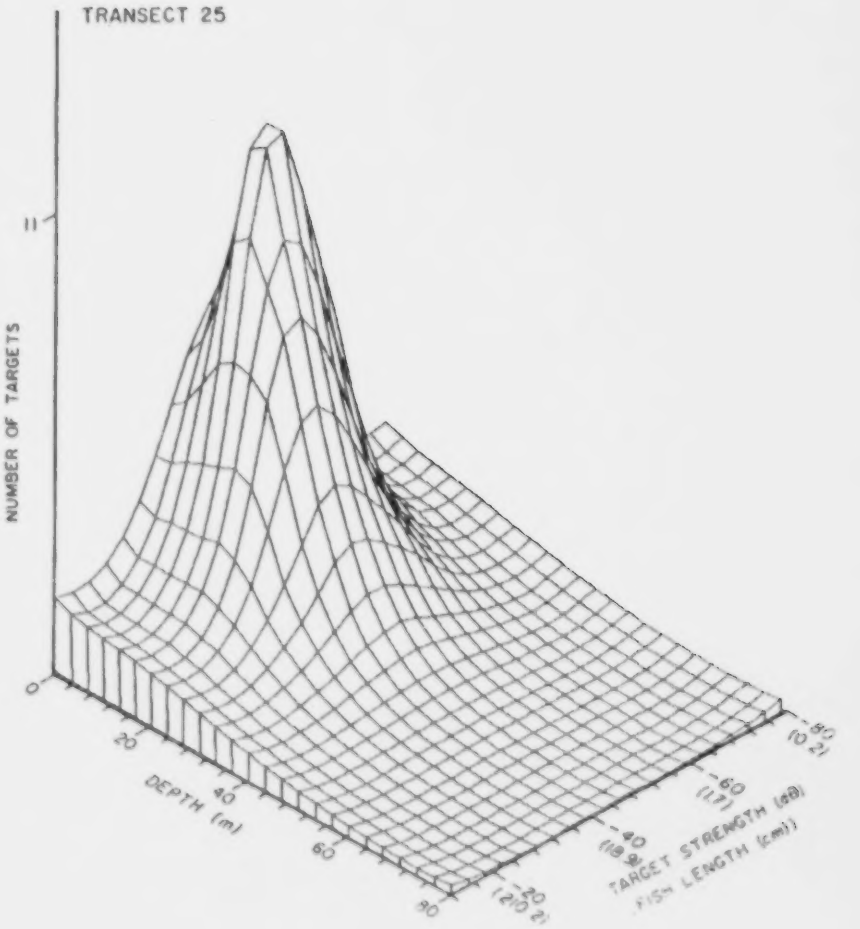

TRANSECT 21
48
NUMBER OF TARGETS
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

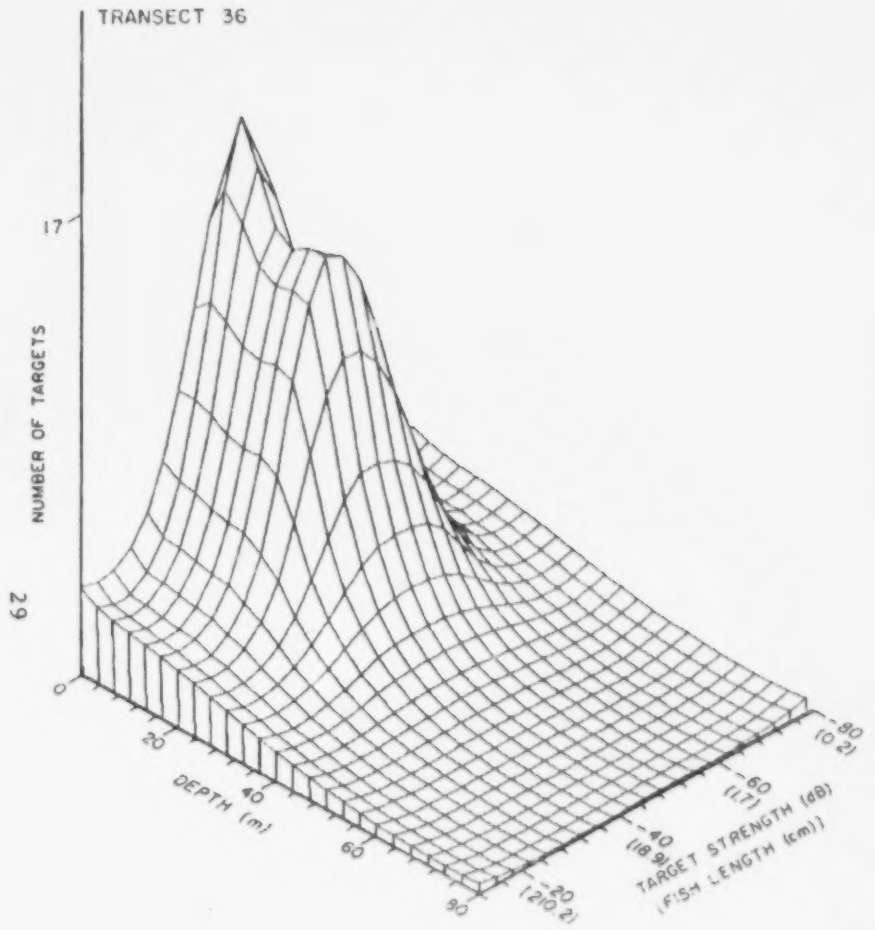

TRANSECT 19
14
NUMBER OF TARGETS
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

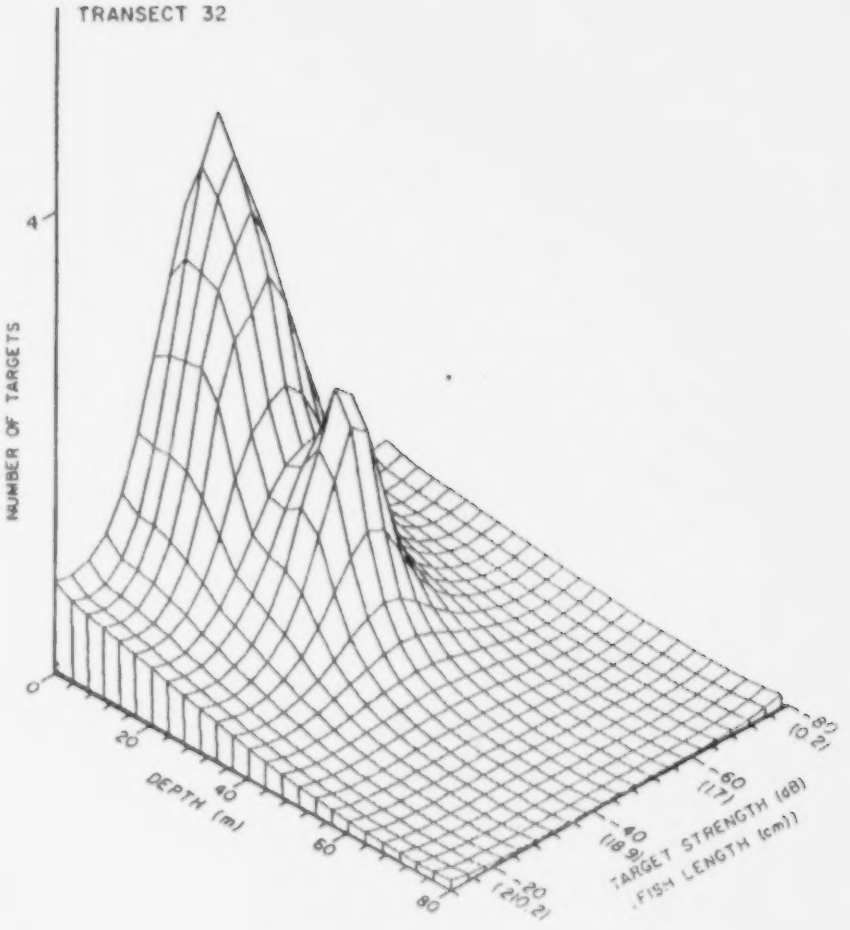

TRANSECT 23B
NUMBER OF TARGETS
21
27
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(118.9)
-60
(11.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

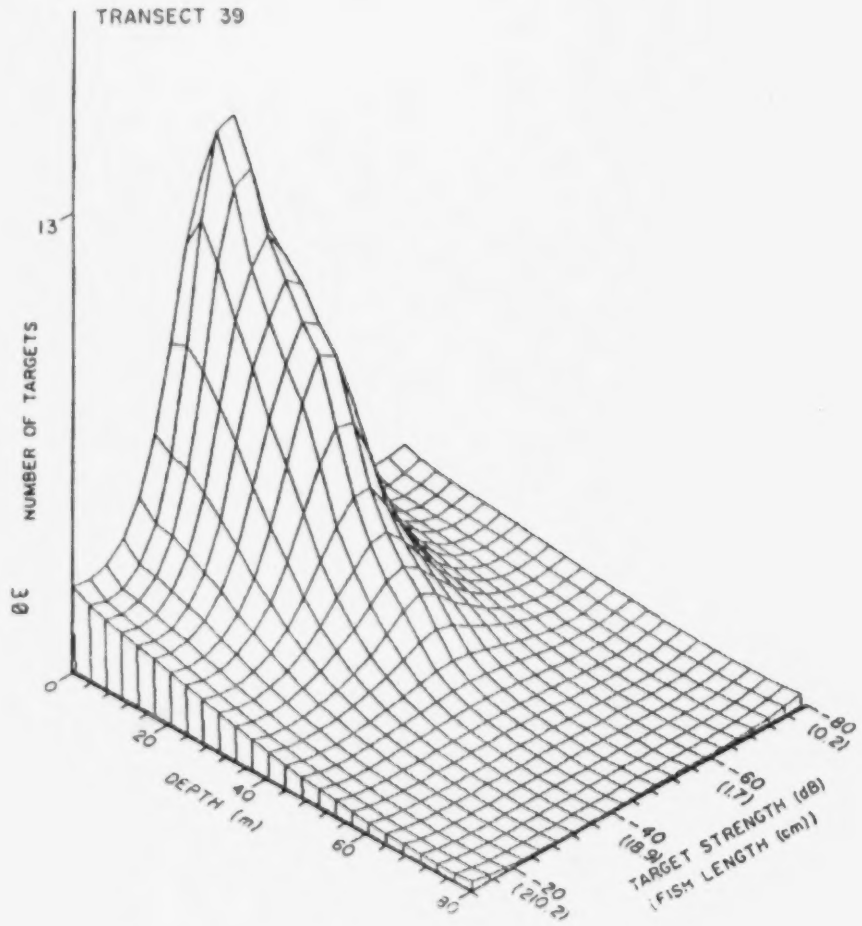

TRANSECT 23A
NUMBER OF TARGETS
32
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(118.9)
-60
(11.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

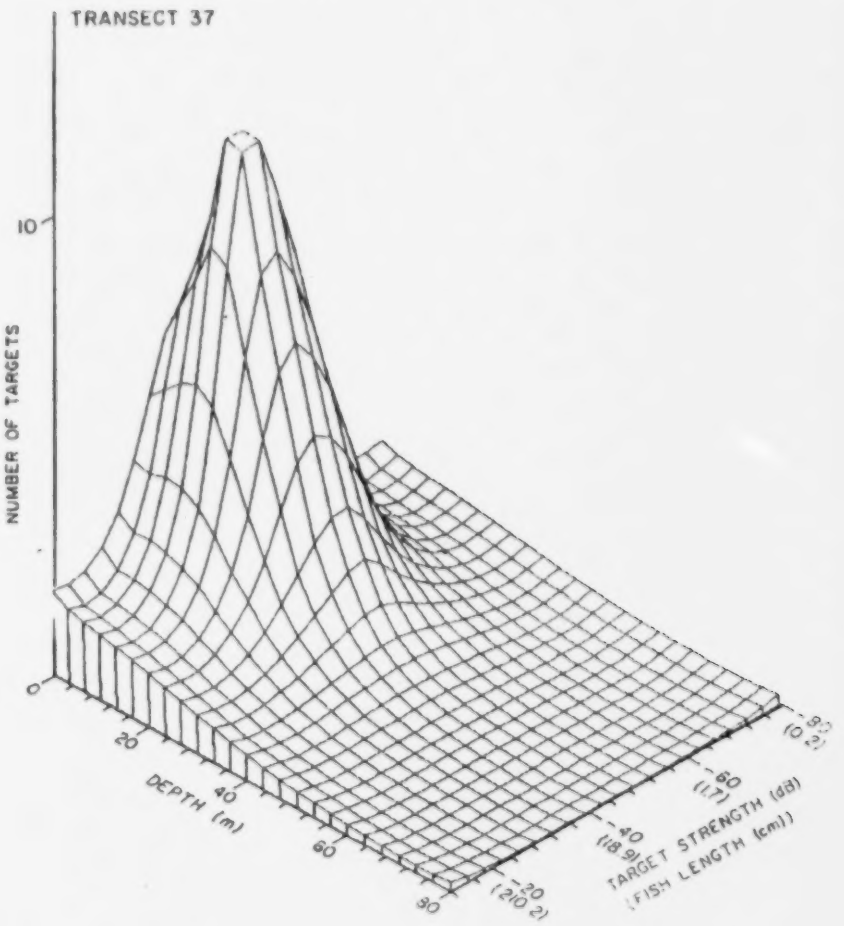

TRANSECT 30
NUMBER OF TARGETS
4
0
82
20
DEPTH (m)
40
60
80
-20
(-20.2)
-40
(-17.9)
-60
(-11.7)
-80
(-10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

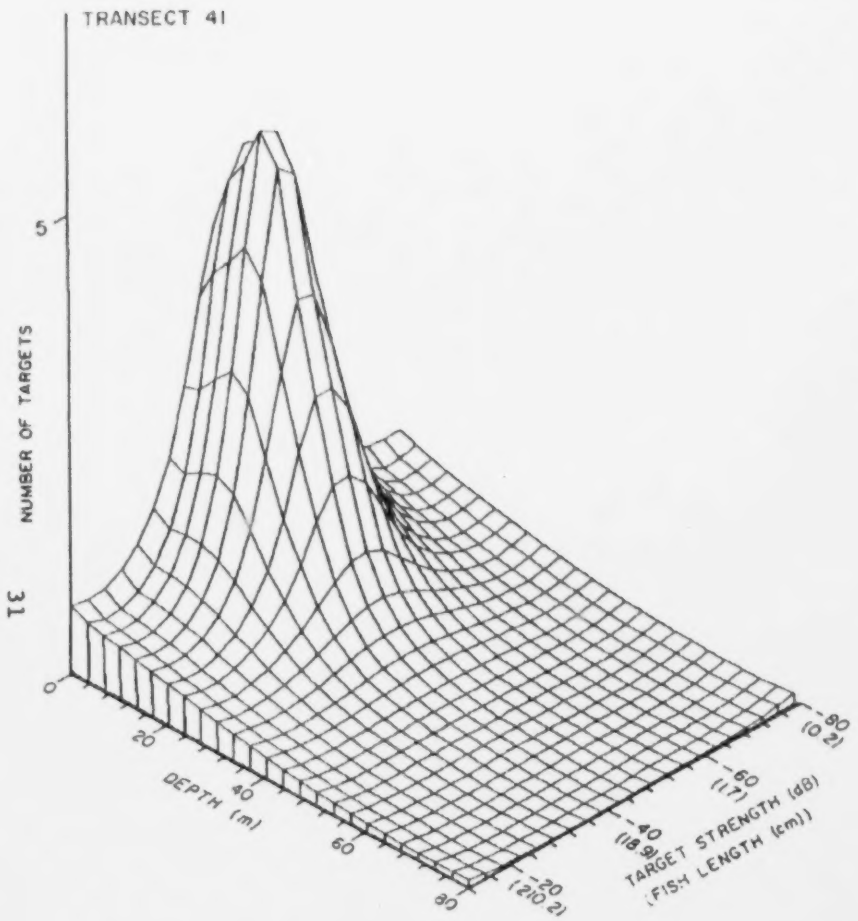

TRANSECT 25
NUMBER OF TARGETS
11
0
20
DEPTH (m)
40
60
80
-20
(-20.2)
-40
(-17.9)
-60
(-11.7)
-80
(-10.2)
TARGET STRENGTH (dB)
FISH LENGTH (cm))

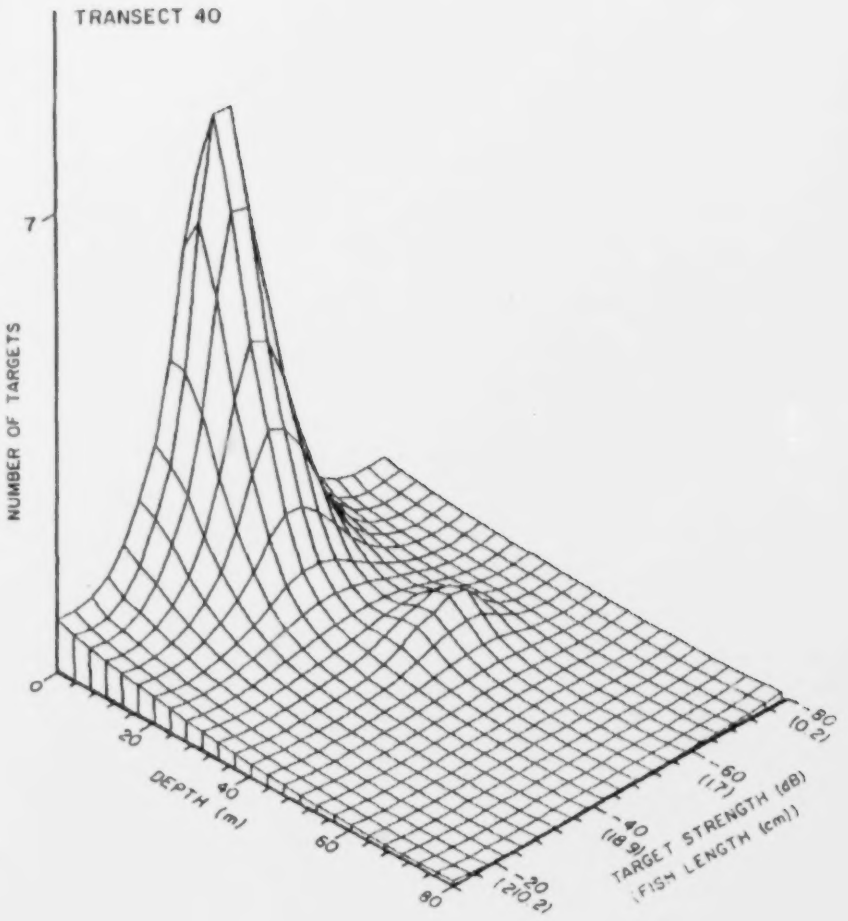

TRANSECT 36
17
0
NUMBER OF TARGETS
29
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

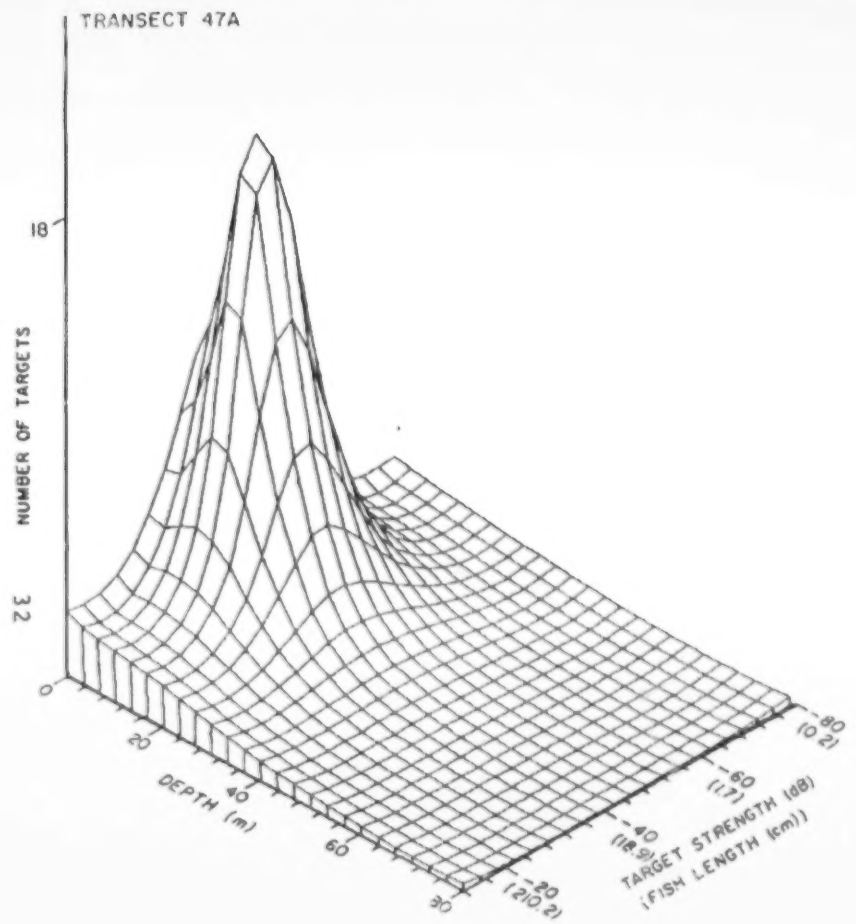

TRANSECT 32
4
0
NUMBER OF TARGETS
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

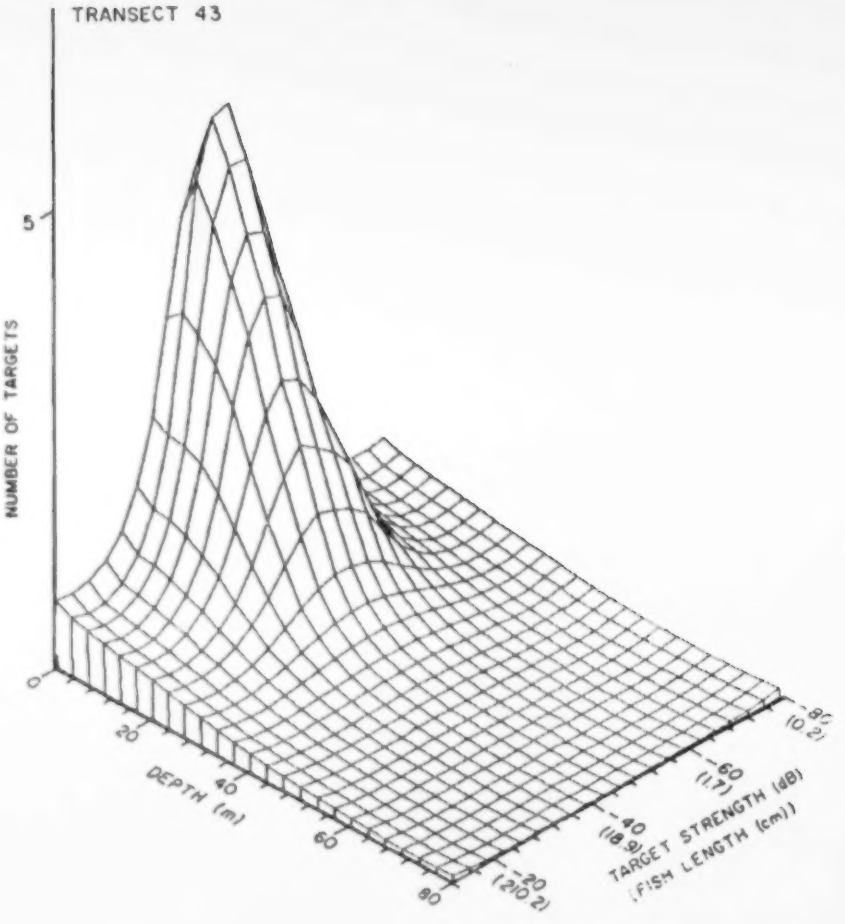

TRANSECT 39
NUMBER OF TARGETS
13
0
DEPTH (m)
20
40
60
80
-20 (21.0 2)
-40 (18.9)
-60 (17)
-80 (10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

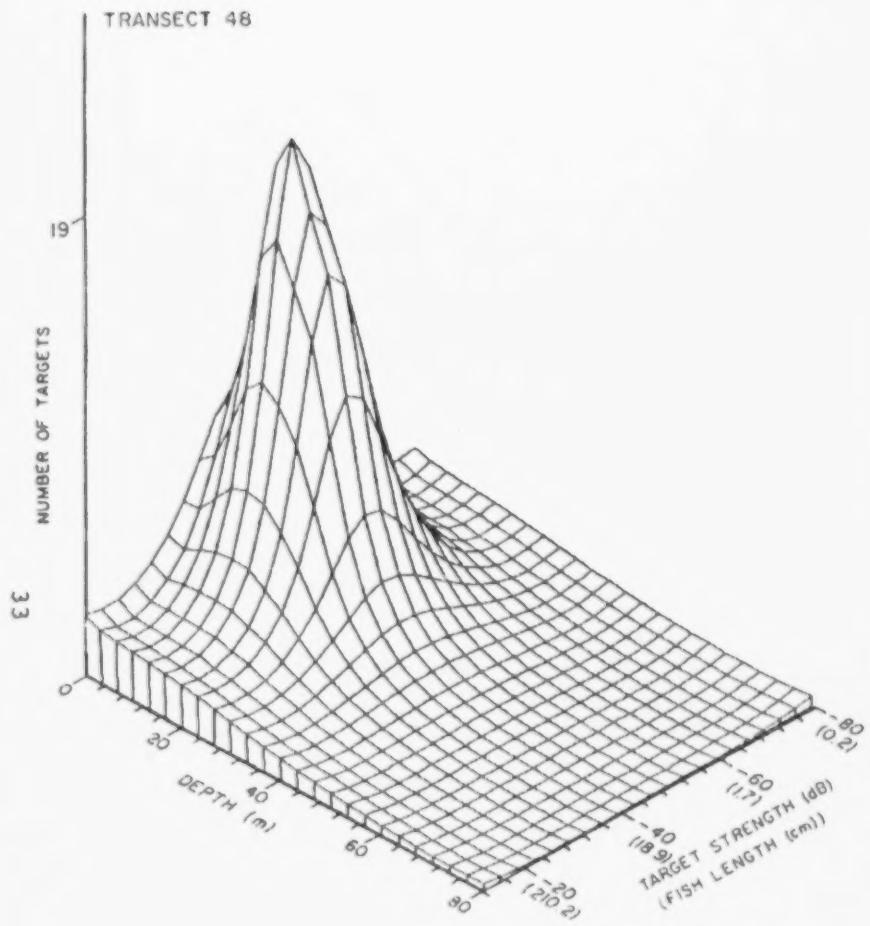

TRANSECT 37
NUMBER OF TARGETS
10
0
DEPTH (m)
20
40
60
80
-20 (21.0 2)
-40 (18.9)
-60 (17)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

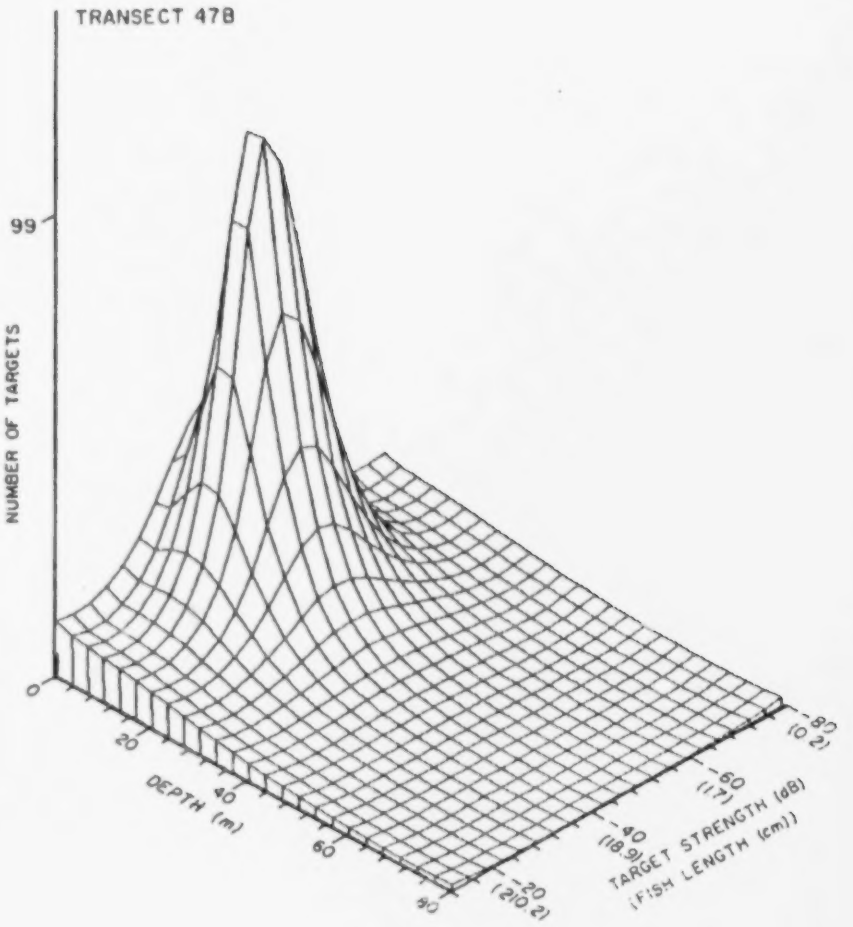

TRANSECT 41
NUMBER OF TARGETS
5
0
20
DEPTH (m)
40
60
80
-20
(210 2)
-40
(118 9)
-60
(17)
-80
(10 2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

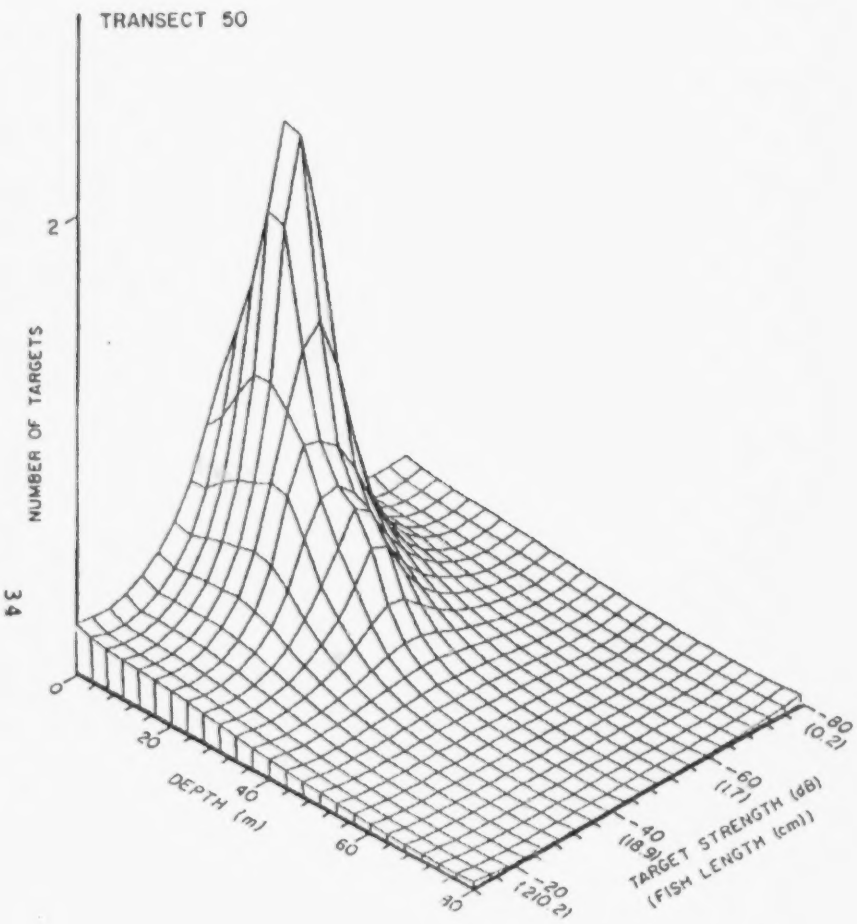

TRANSECT 40
NUMBER OF TARGETS
7
0
20
DEPTH (m)
40
60
80
-20
(210 2)
-40
(118 9)
-60
(17)
-80
(10 2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

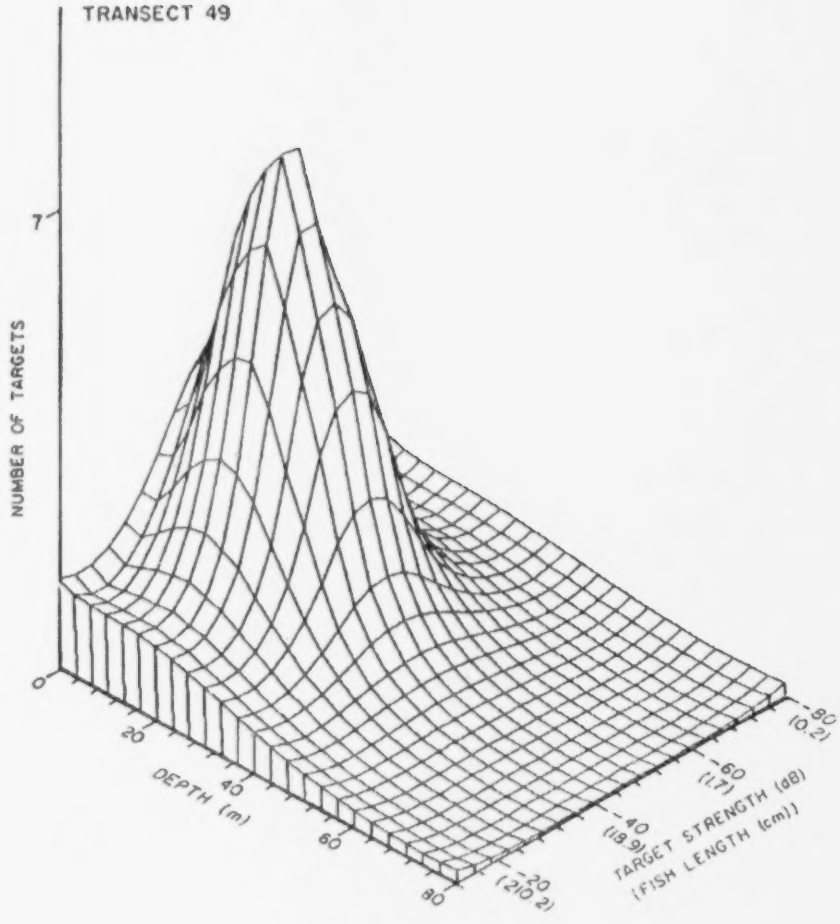

TRANSECT 47A
NUMBER OF TARGETS
18
32
0
20
40
60
80
DEPTH (m)
-20
(21.0.2)
-40
(18.9)
-60
(17)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

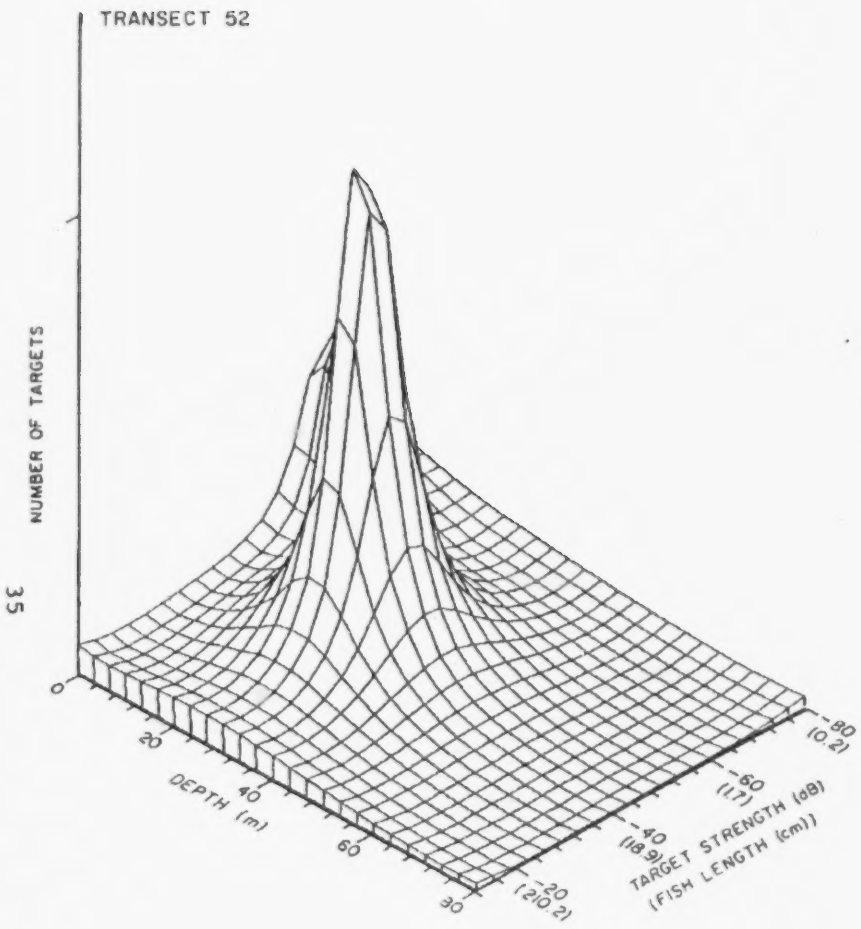

TRANSECT 43
NUMBER OF TARGETS
5
0
20
40
60
80
DEPTH (m)
-20
(21.0.2)
-40
(18.9)
-60
(17)
-80
(10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

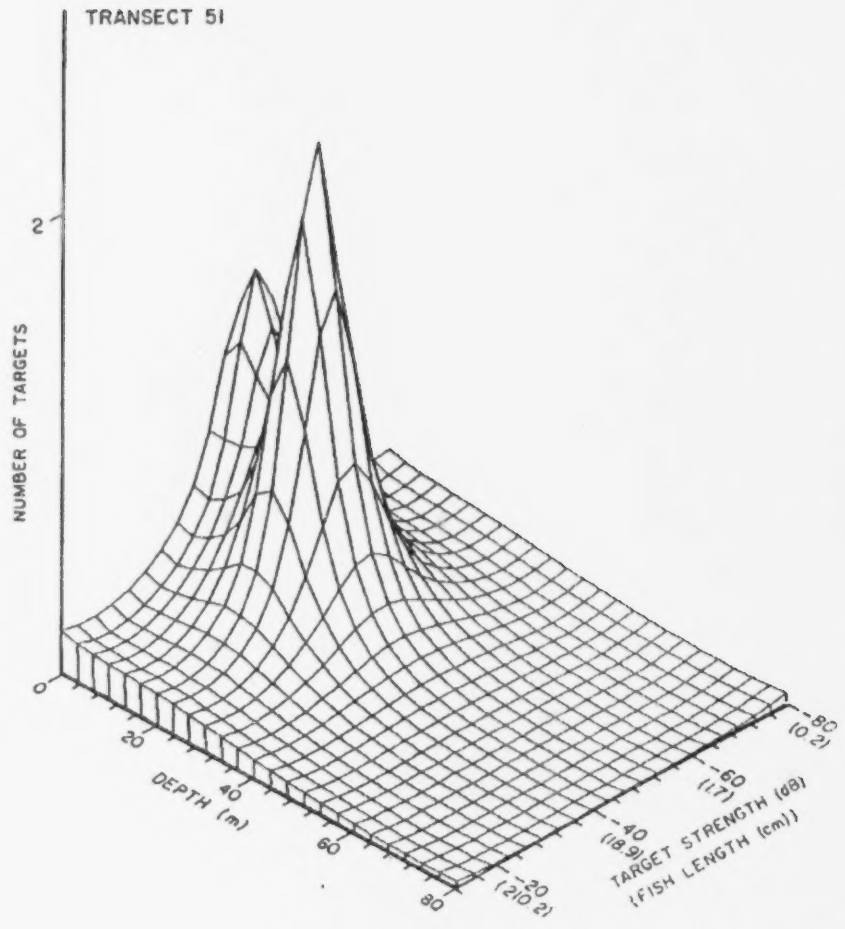

TRANSECT 48
19
0
NUMBER OF TARGETS
DEPTH (m)
20
40
60
80
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

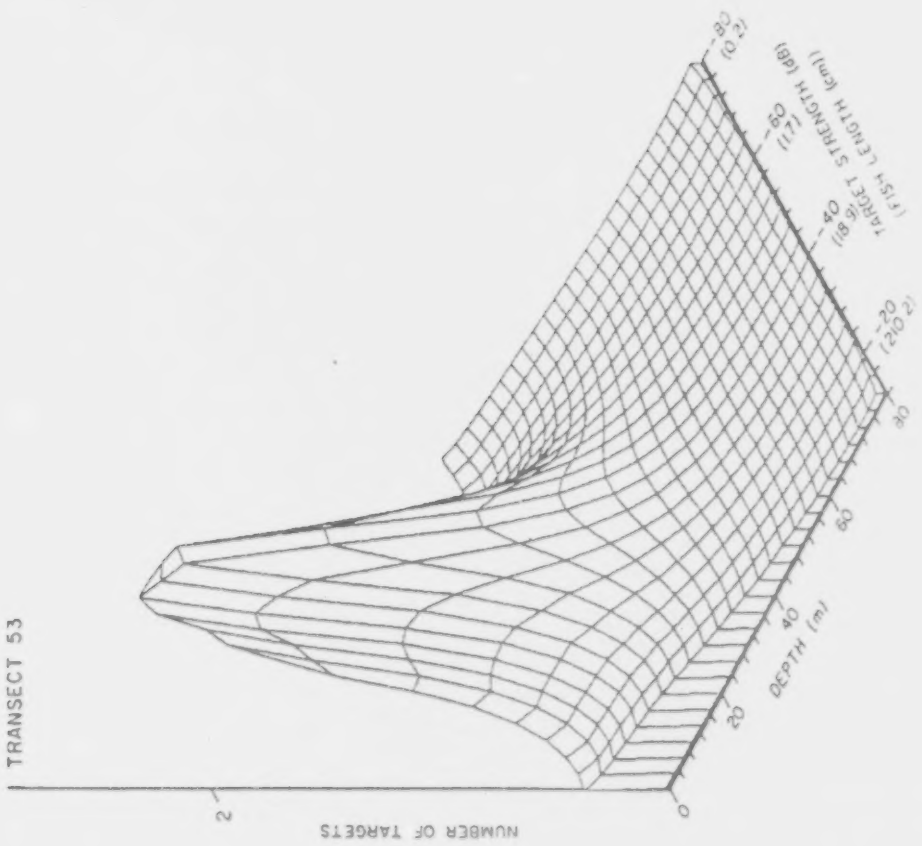

TRANSECT 478
99
0
NUMBER OF TARGETS
DEPTH (m)
20
40
60
80
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

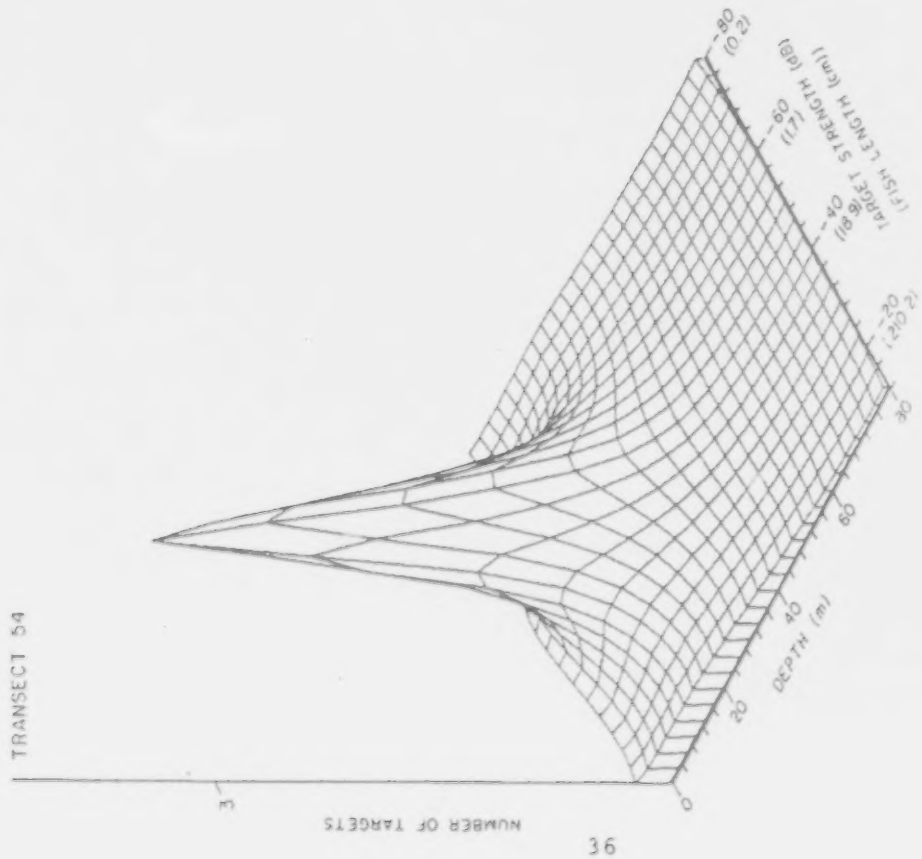

TRANSECT 50
NUMBER OF TARGETS
2
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

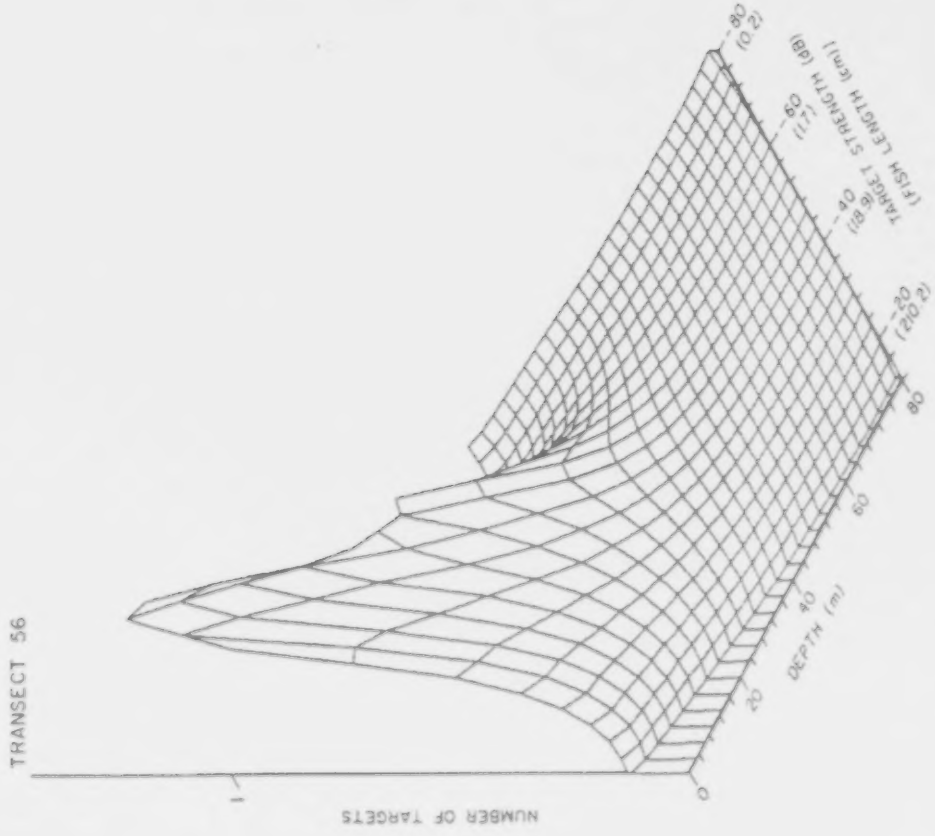

TRANSECT 49
NUMBER OF TARGETS
7
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

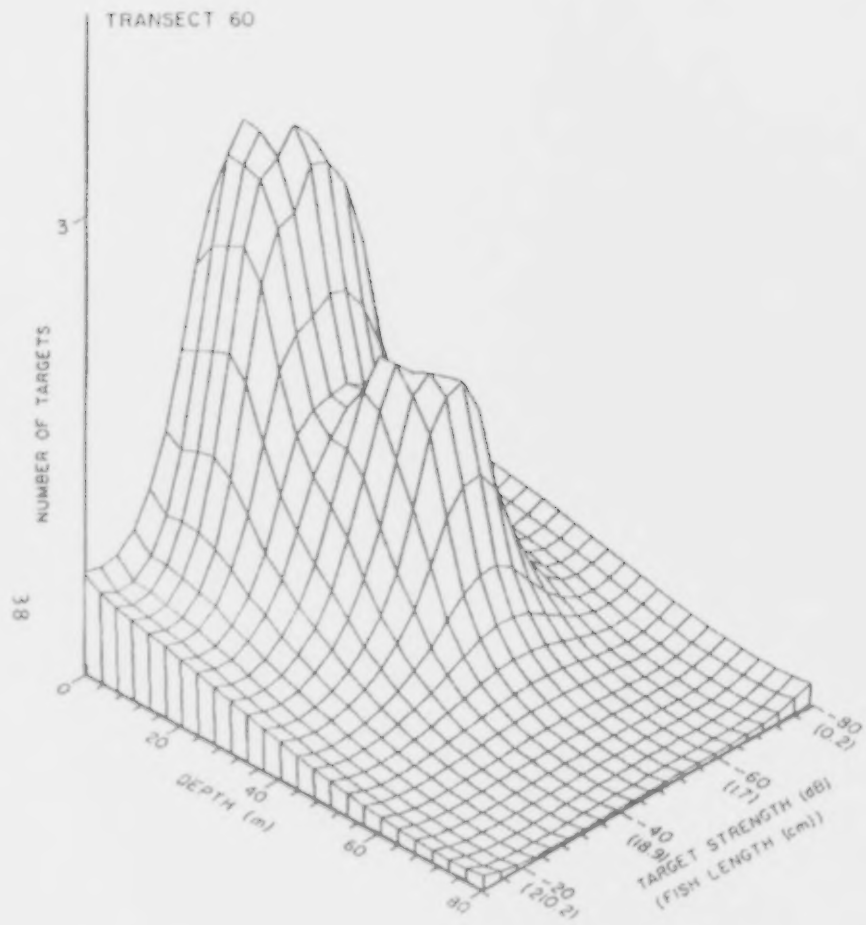

TRANSECT 52
NUMBER OF TARGETS
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

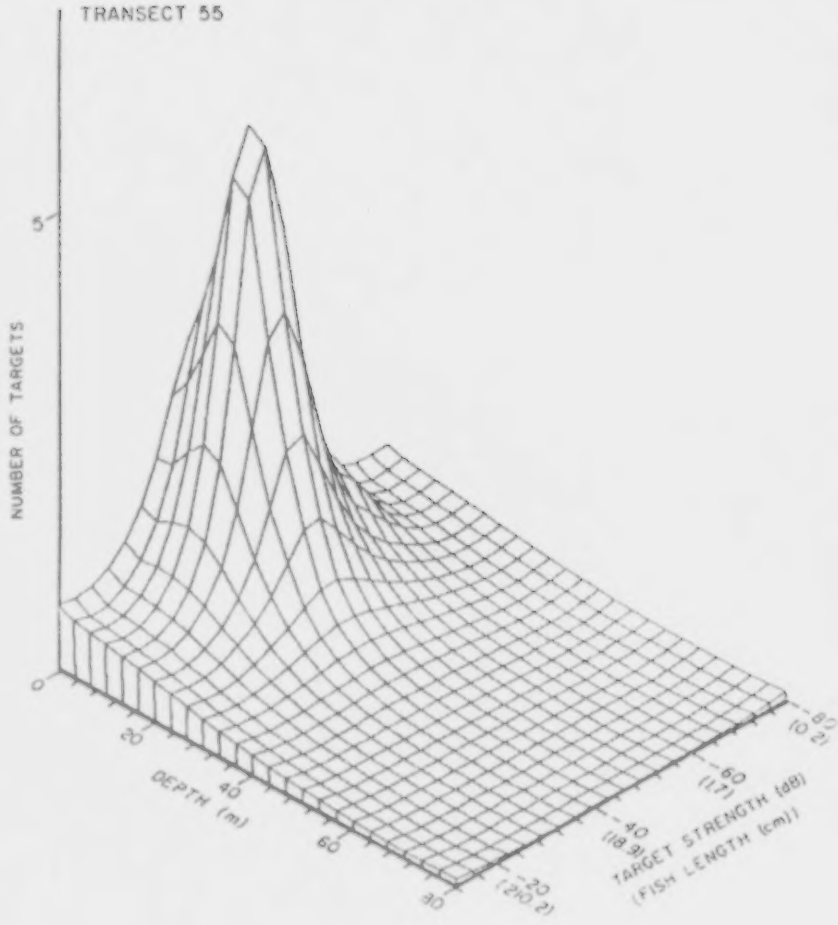

TRANSECT 51
NUMBER OF TARGETS
2
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

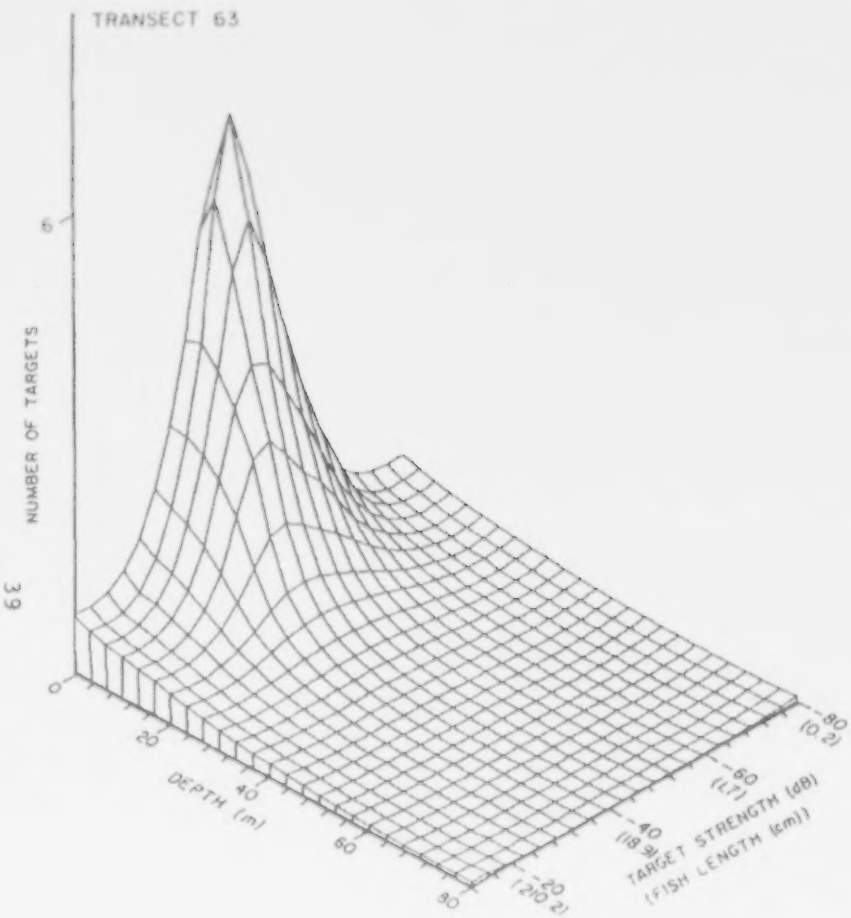

TRANSECT 53
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
-80 (0.2)
-60 (1.1)
-40 (6.8)
-20 (20.2)
FISH LENGTH (cm)

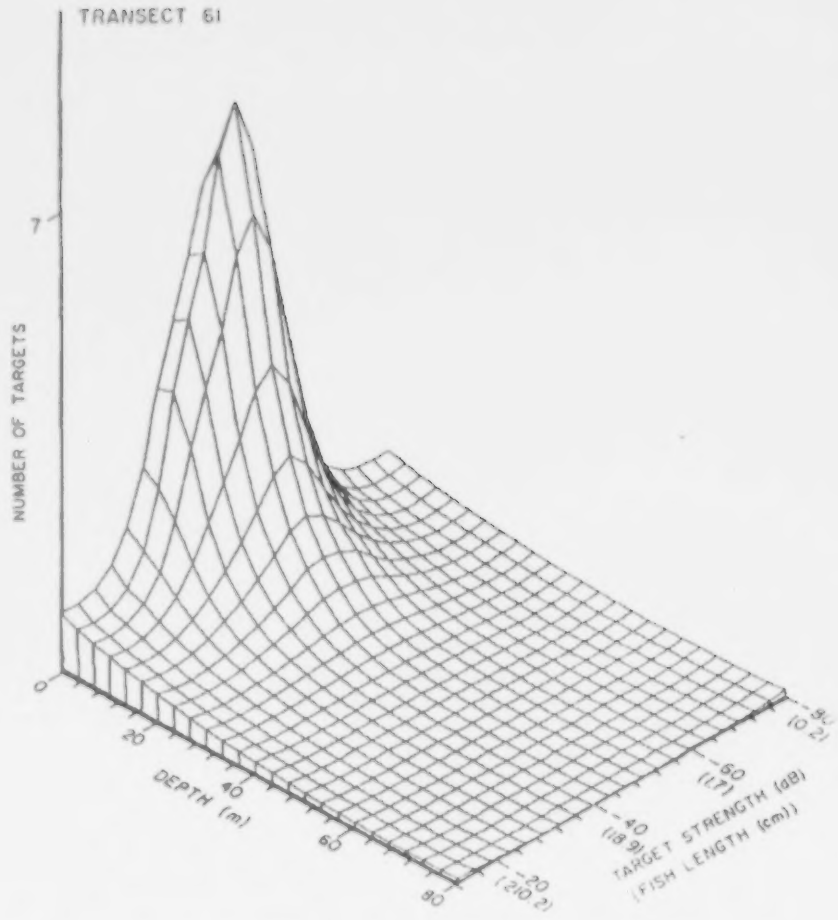

TRANSECT 54
NUMBER OF TARGETS
3
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
-80 (0.2)
-60 (1.1)
-40 (6.8)
-20 (20.2)
FISH LENGTH (cm)

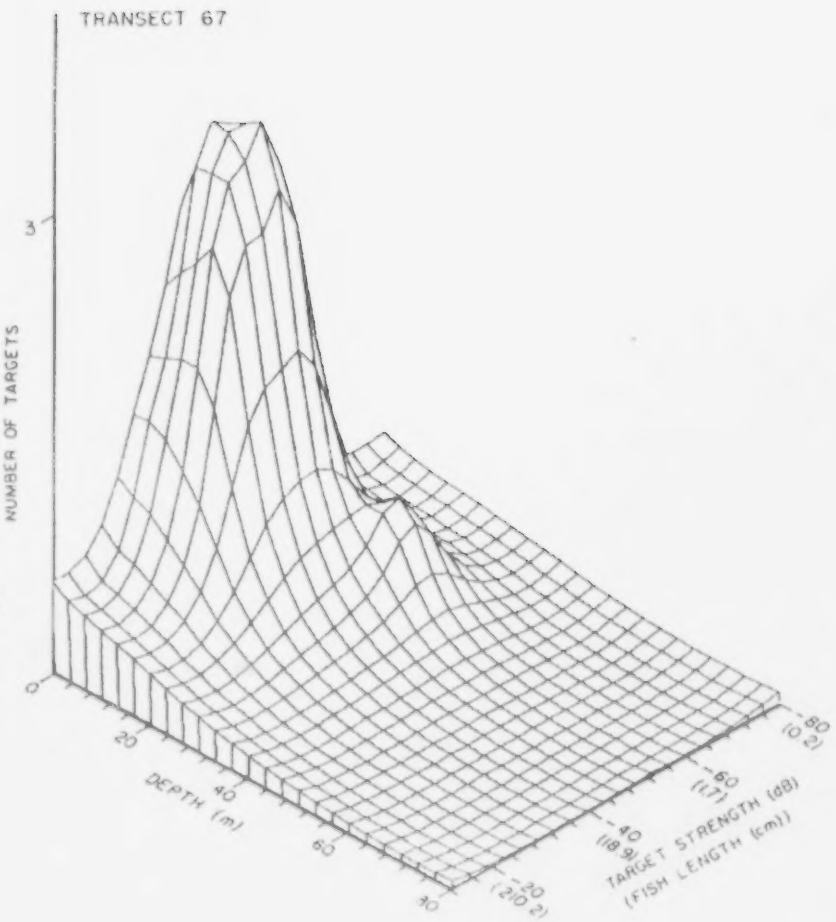

TRANSECT 56
NUMBER OF TARGETS
1
0
20
40
60
80
DEPTH (m)
-80 (0.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

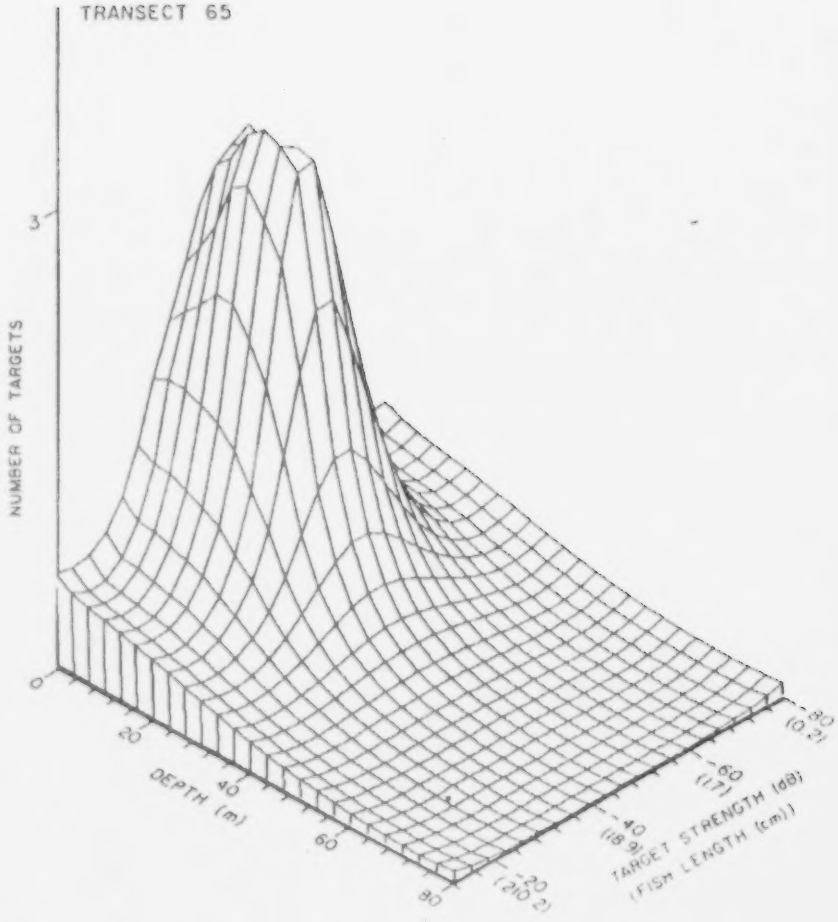

TRANSECT 60
NUMBER OF TARGETS
3
0
20
DEPTH (m)
40
60
80
-20
(-10.2)
-40
(-18.3)
-60
(-27)
-80
(-36.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

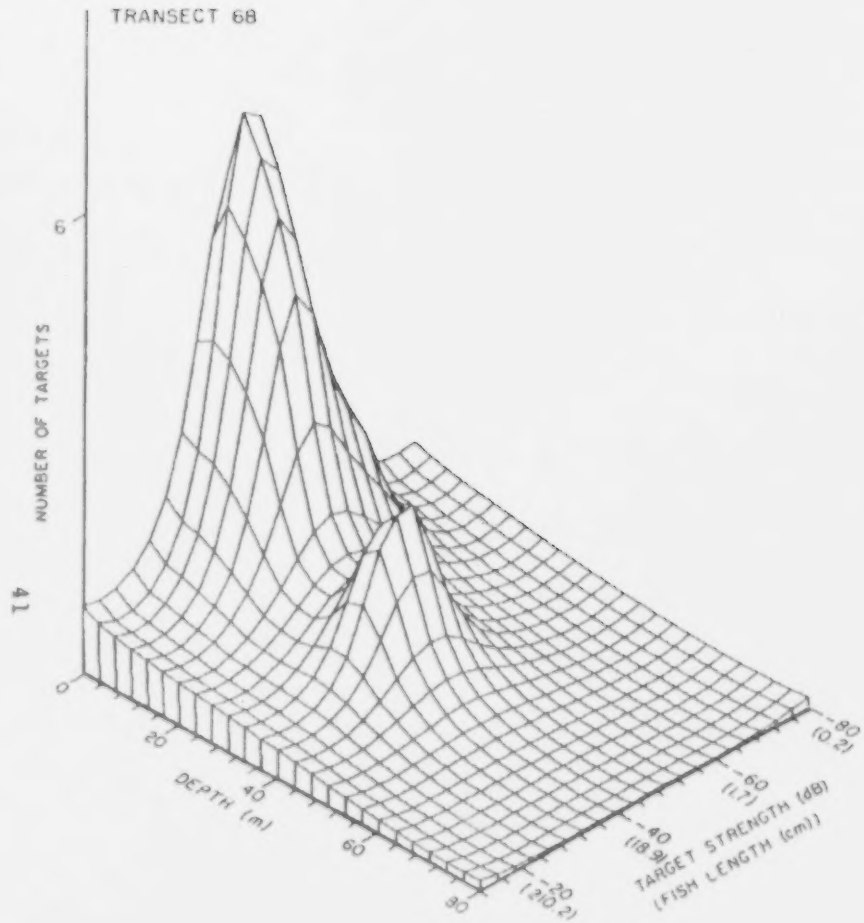

TRANSECT 55
NUMBER OF TARGETS
3
0
20
DEPTH (m)
40
60
80
-20
(-10.2)
-40
(-18.3)
-60
(-27)
-80
(-36.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

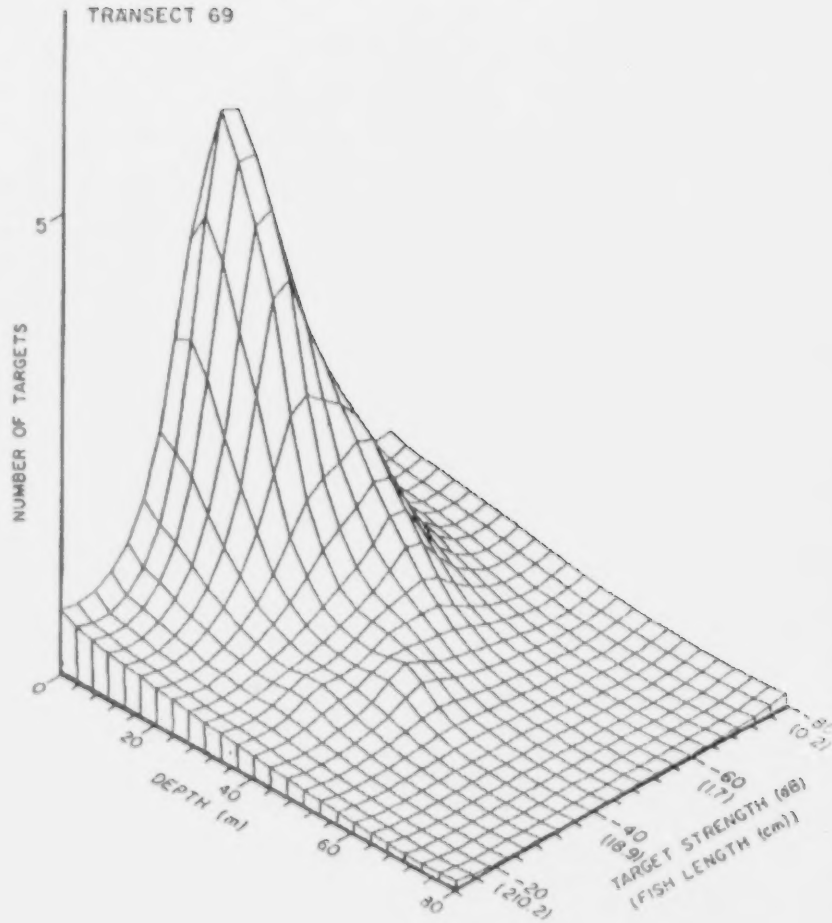

TRANSECT 63
NUMBER OF TARGETS
6
0
20
40
60
80
DEPTH (m)
-80
(10.2)
-60
(1.7)
-40
(118.9)
-20
(210.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))


TRANSECT 61
NUMBER OF TARGETS
7
0
20
40
60
80
DEPTH (m)
-80
(10.2)
-60
(1.7)
-40
(118.9)
-20
(210.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))


TRANSECT 67
NUMBER OF TARGETS
3
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(118.9)
-60
(17.)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))


TRANSECT 65
NUMBER OF TARGETS
3
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(118.9)
-60
(17.)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))


TRANSECT 68
NUMBER OF TARGETS
6
0
20
40
60
80
DEPTH (m)
-30
(210.2)
-40
(118.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))


TRANSECT 69
NUMBER OF TARGETS
5
0
20
40
60
80
DEPTH (m)
-30
(210.2)
-40
(118.9)
-60
(1.7)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

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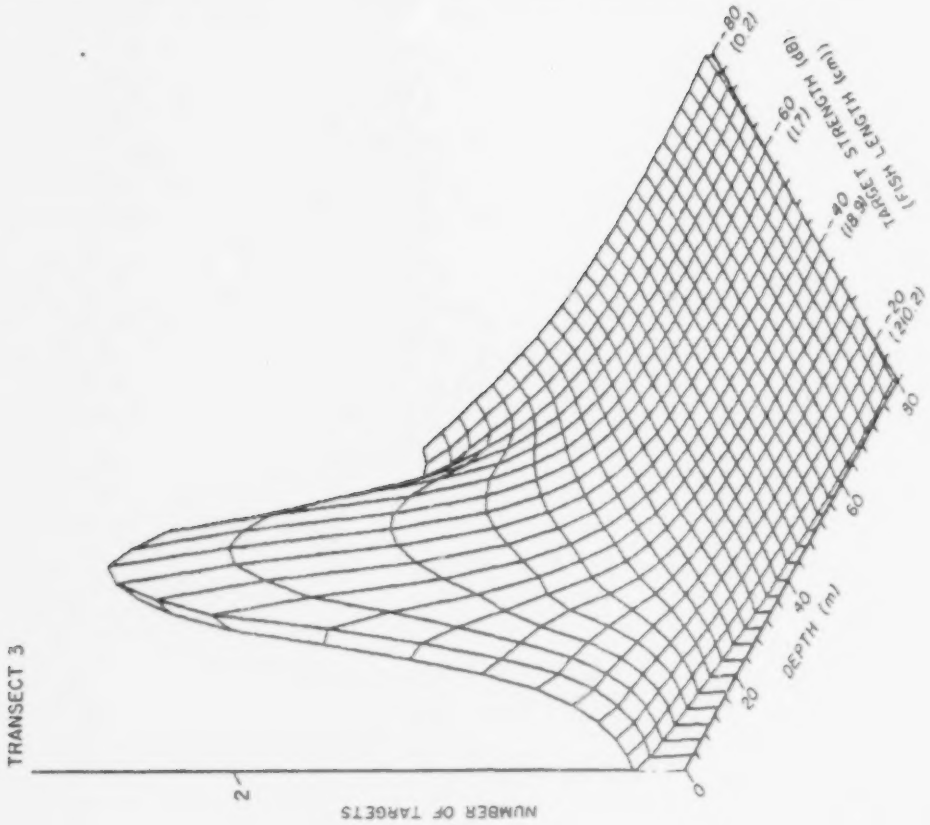
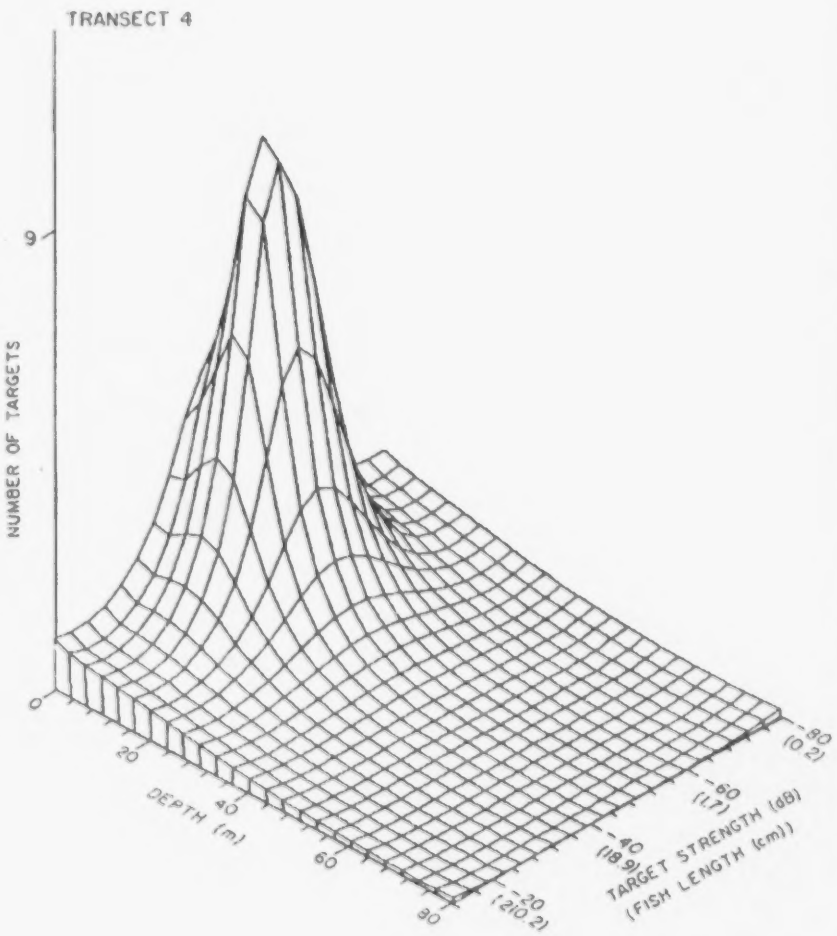
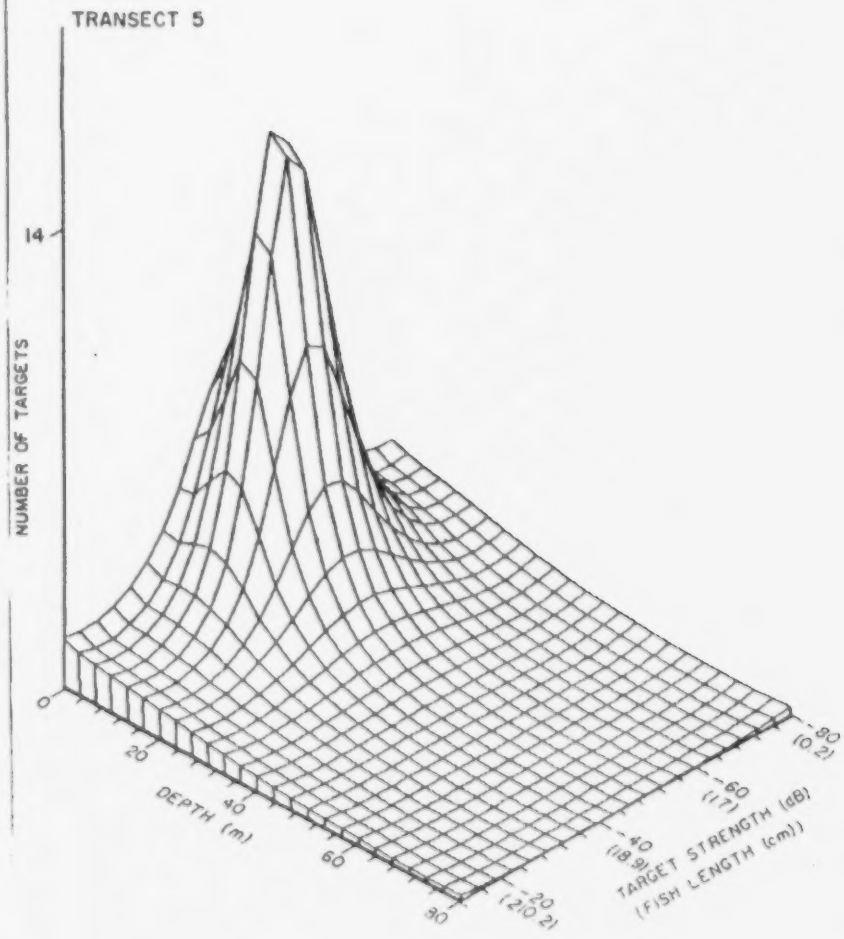
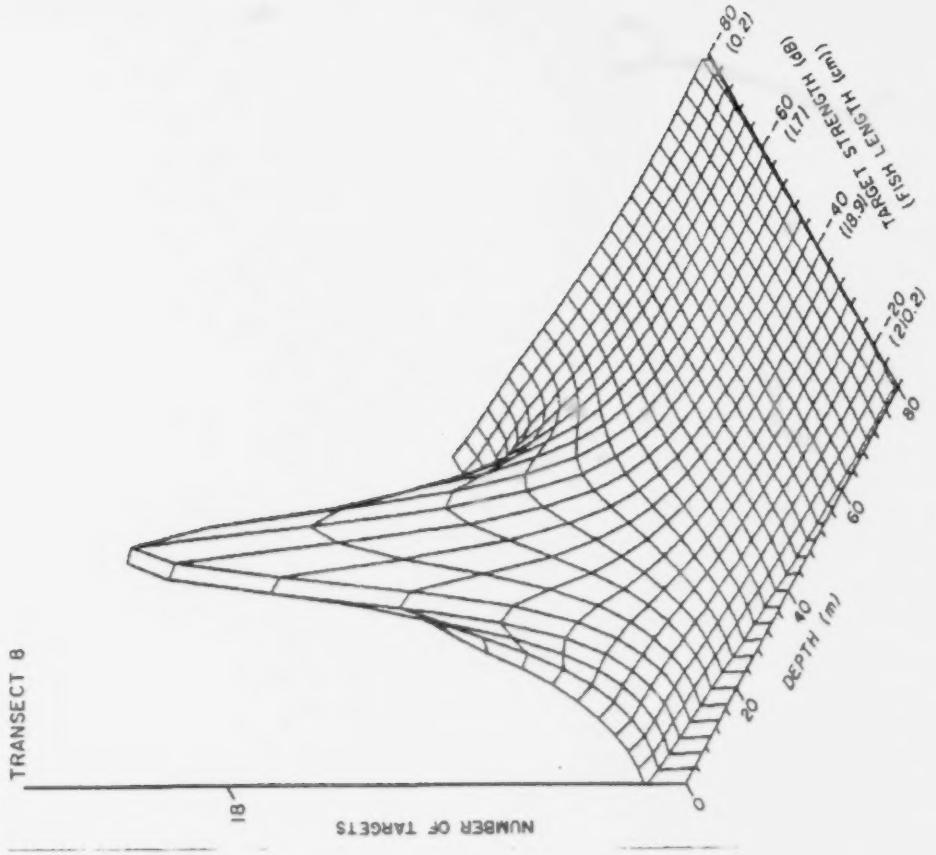
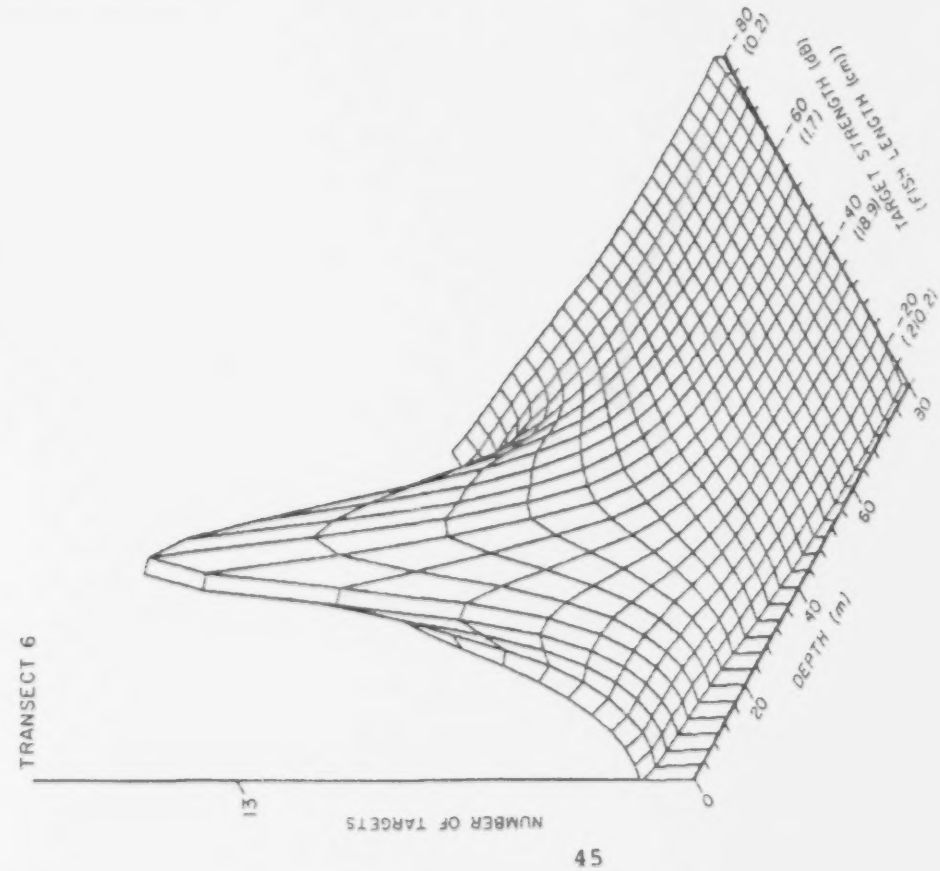
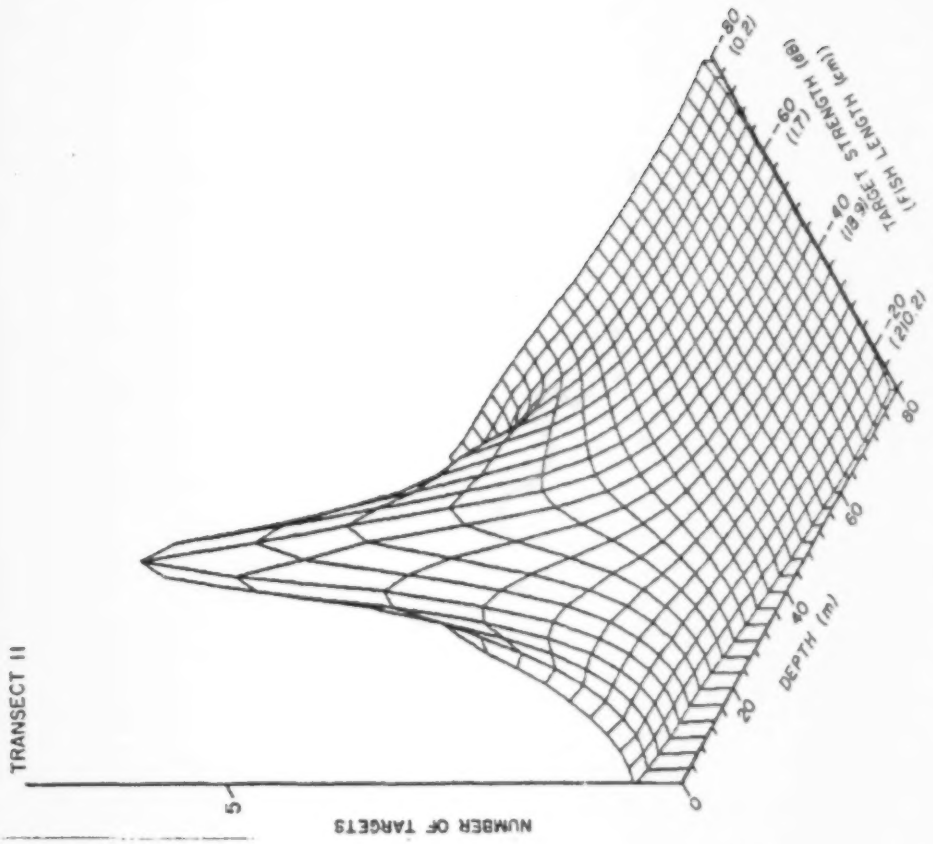

TRANSECT 3
NUMBER OF TARGETS
2
DEPTH (m)
0
20
40
60
80
-80 (0.2)
-60 (2.1)
-40 (8.8)
-20 (20.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

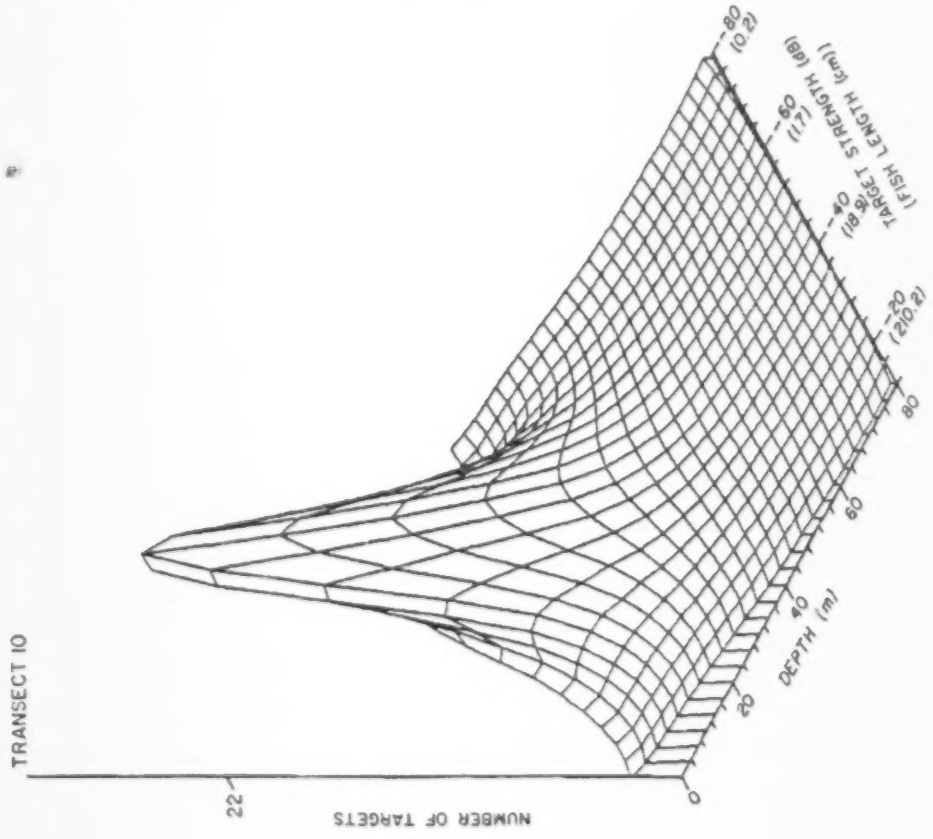

TRANSECT 4
NUMBER OF TARGETS
9
0
20
DEPTH (m)
40
60
80
-20 (210.2)
-40 (118.9)
-60 (1.7)
-80 (0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

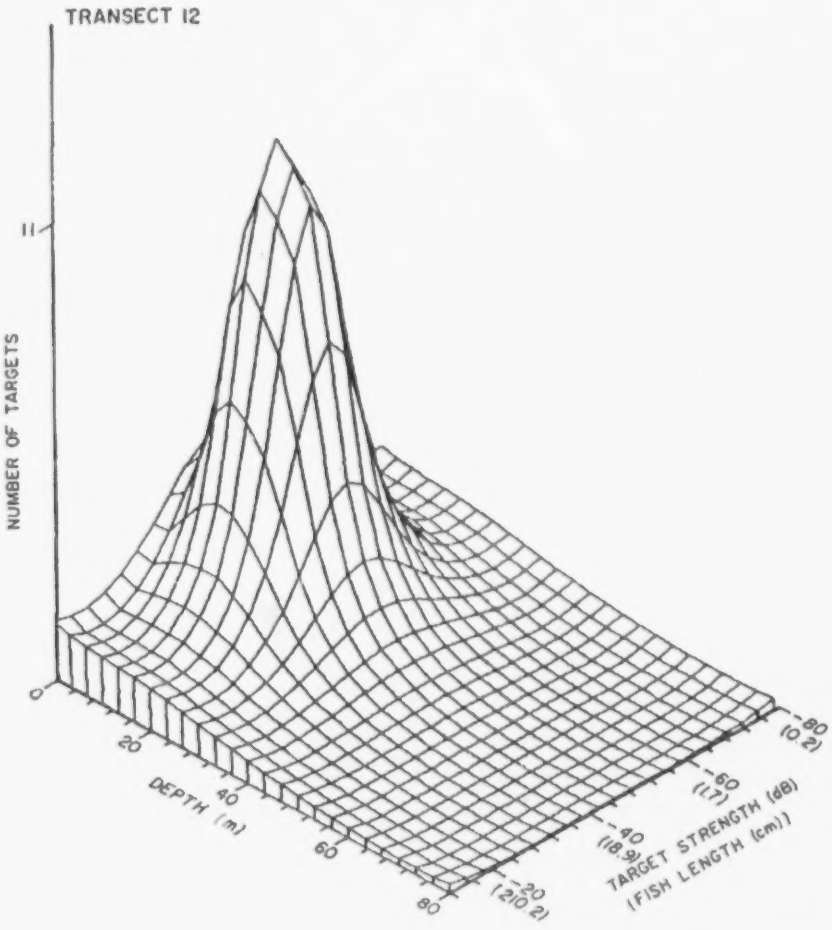

TRANSECT 5
NUMBER OF TARGETS
14
0
20
DEPTH (m)
40
60
80
-20 (210.2)
-40 (118.9)
-60 (1.7)
-80 (0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

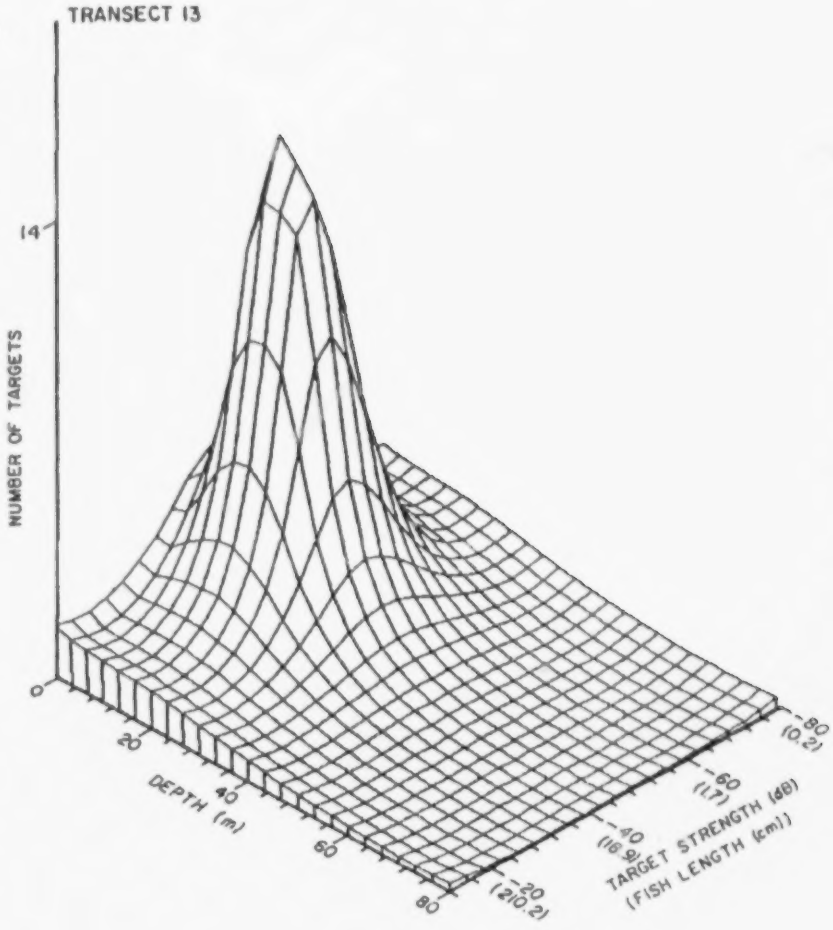

TRANSECT 8
NUMBER OF TARGETS
18
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (18.9)
-60 (1.1)
-80 (0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

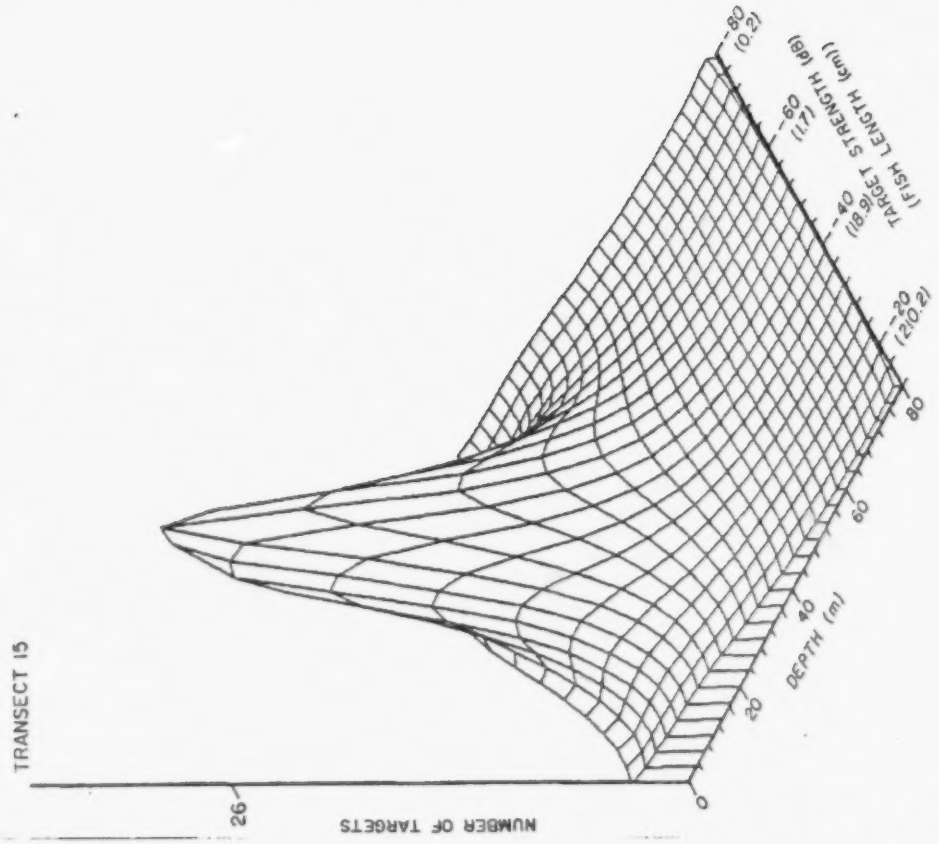

TRANSECT 6
NUMBER OF TARGETS
13
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (18.9)
-60 (1.1)
-80 (0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

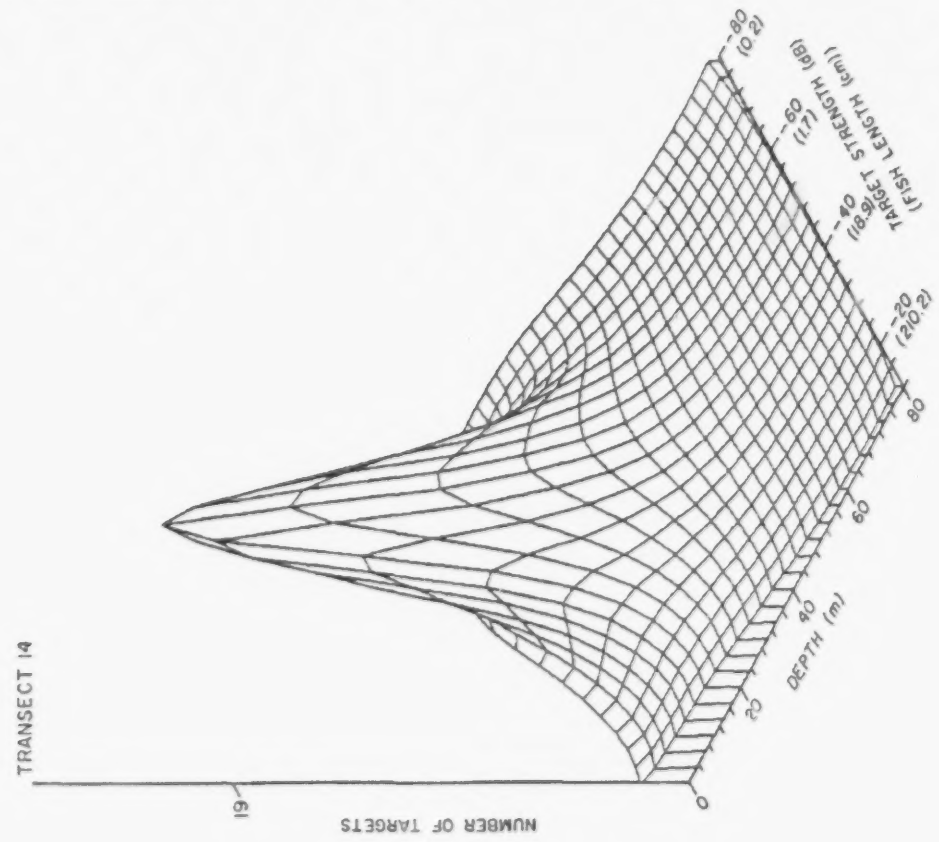

TRANSECT 11
NUMBER OF TARGETS
5
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (8.8)
-20 (210.2)

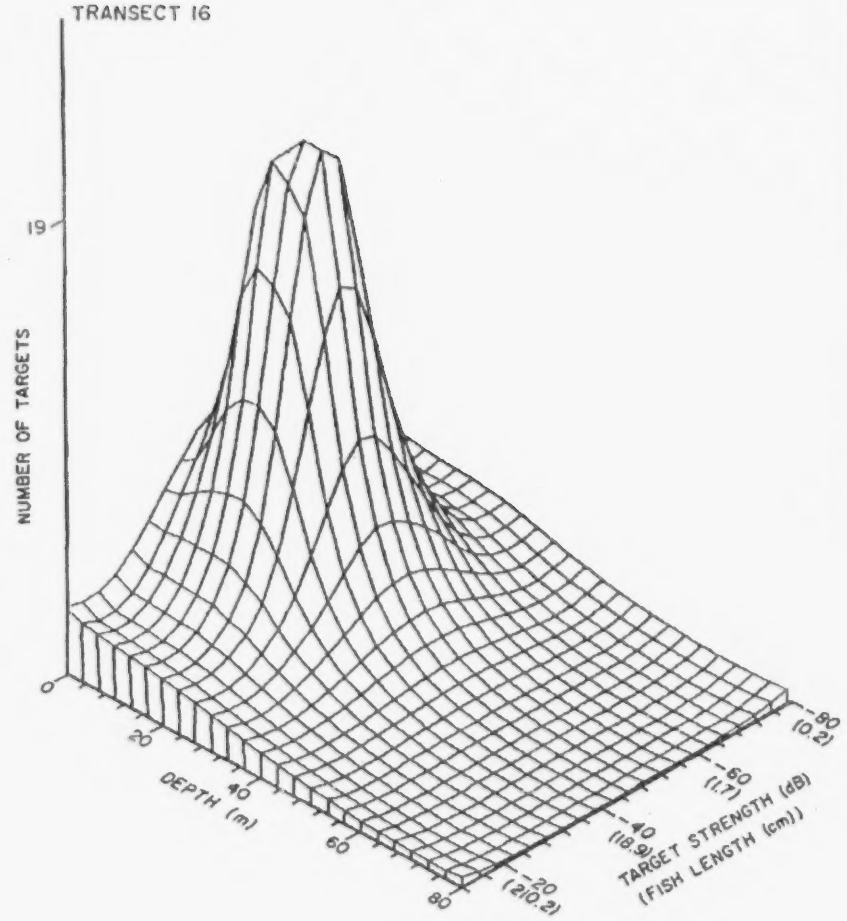

TRANSECT 10
NUMBER OF TARGETS
22
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (8.8)
-20 (210.2)

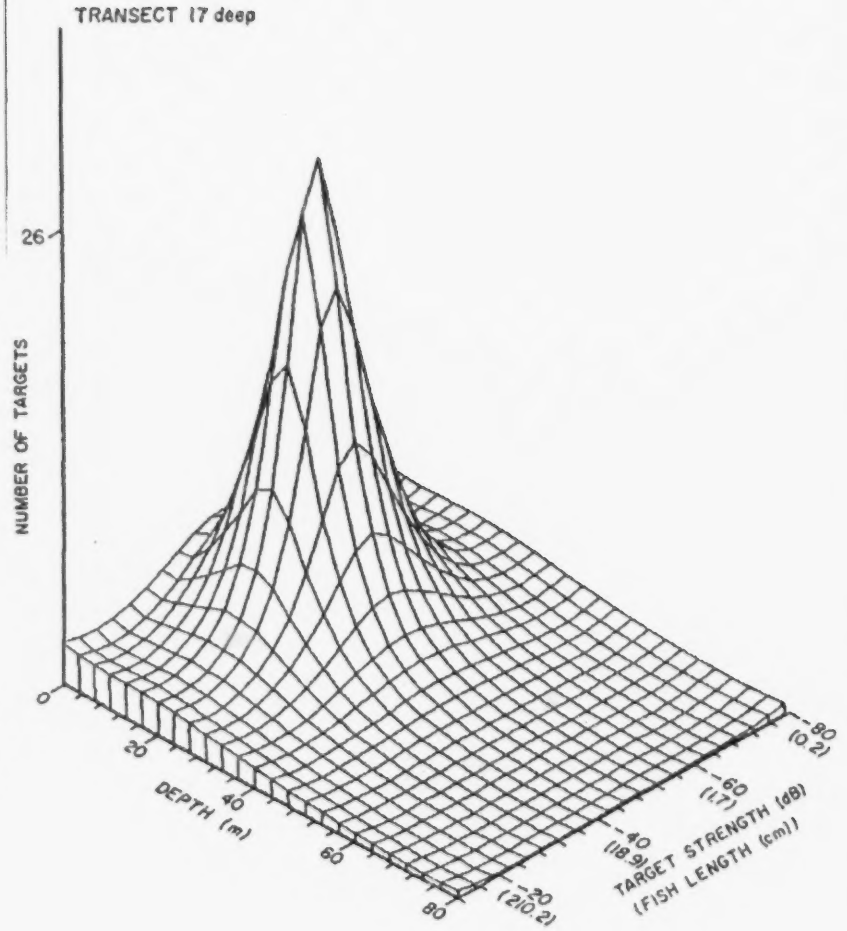

TRANSECT 12
11
NUMBER OF TARGETS
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

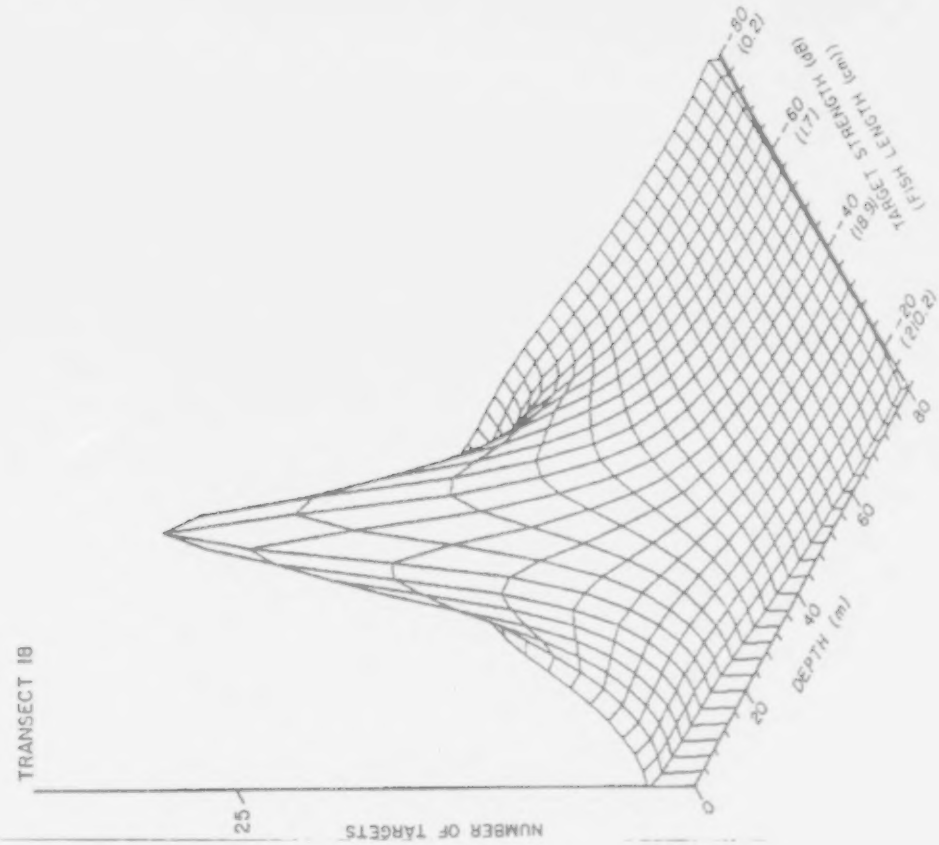

TRANSECT 13
14
NUMBER OF TARGETS
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

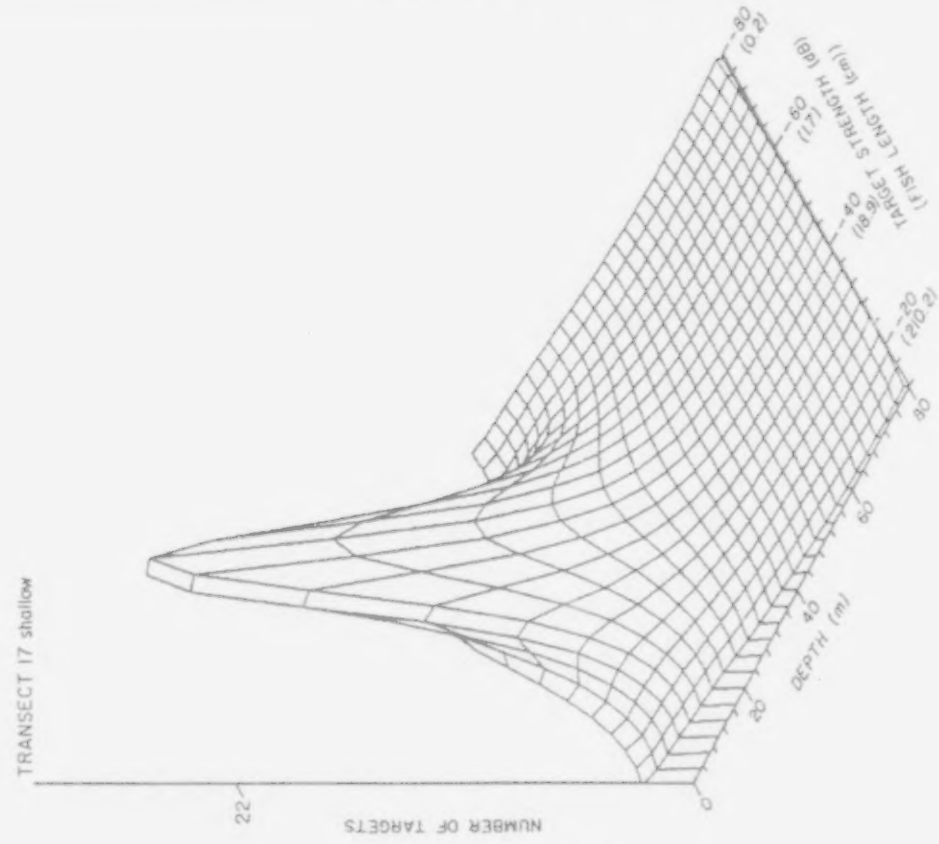

TRANSECT 15
NUMBER OF TARGETS
26
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm))
-80 (10.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)

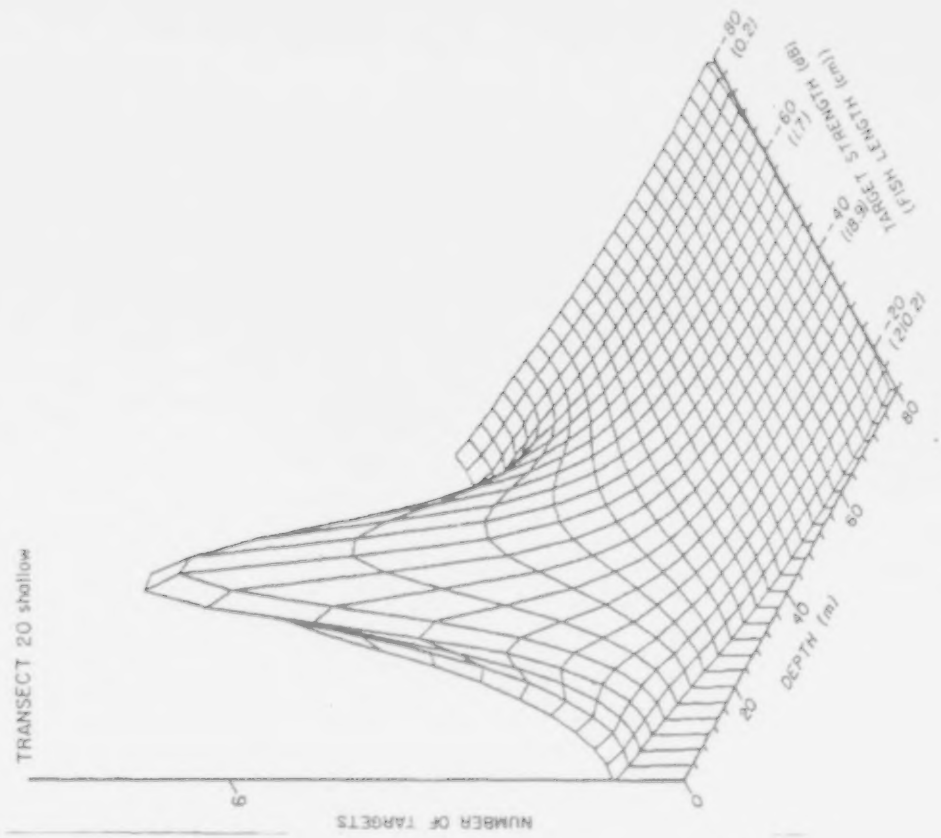

TRANSECT 14
NUMBER OF TARGETS
19
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm))
-80 (10.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)

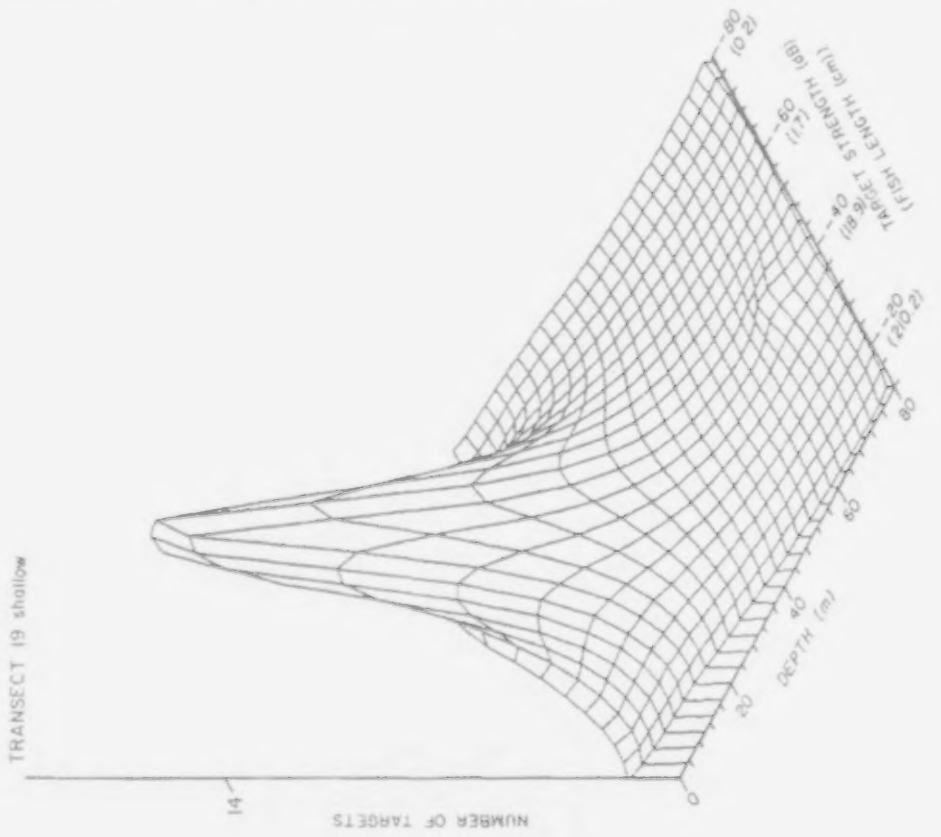

TRANSECT 16
19
NUMBER OF TARGETS
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

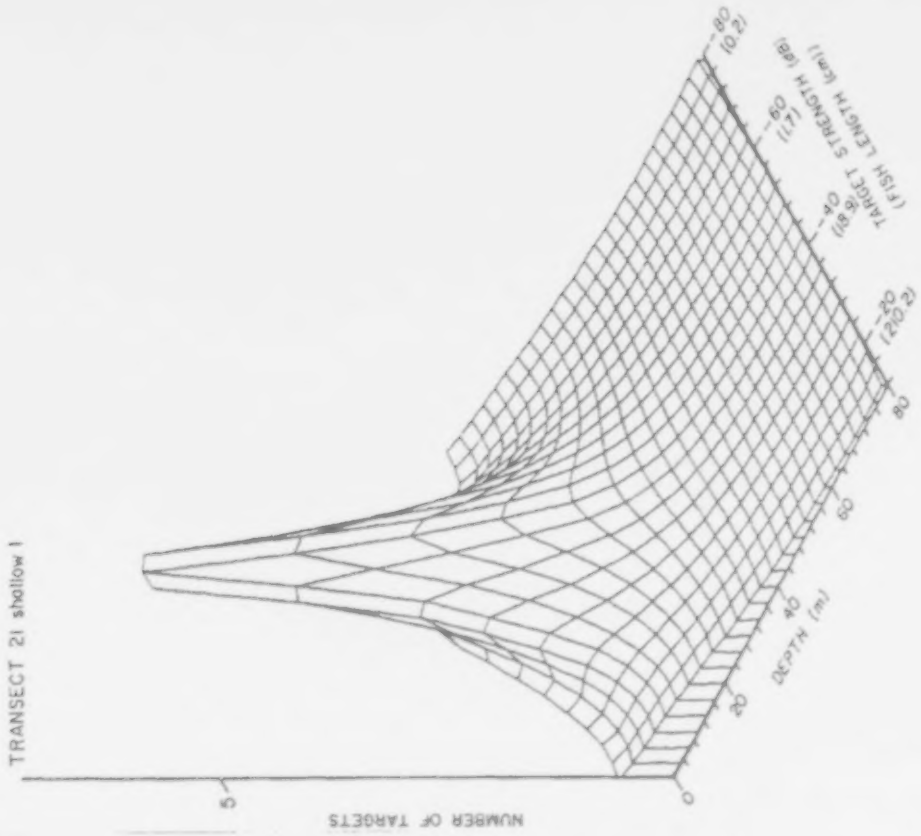

TRANSECT 17 deep
26
NUMBER OF TARGETS
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

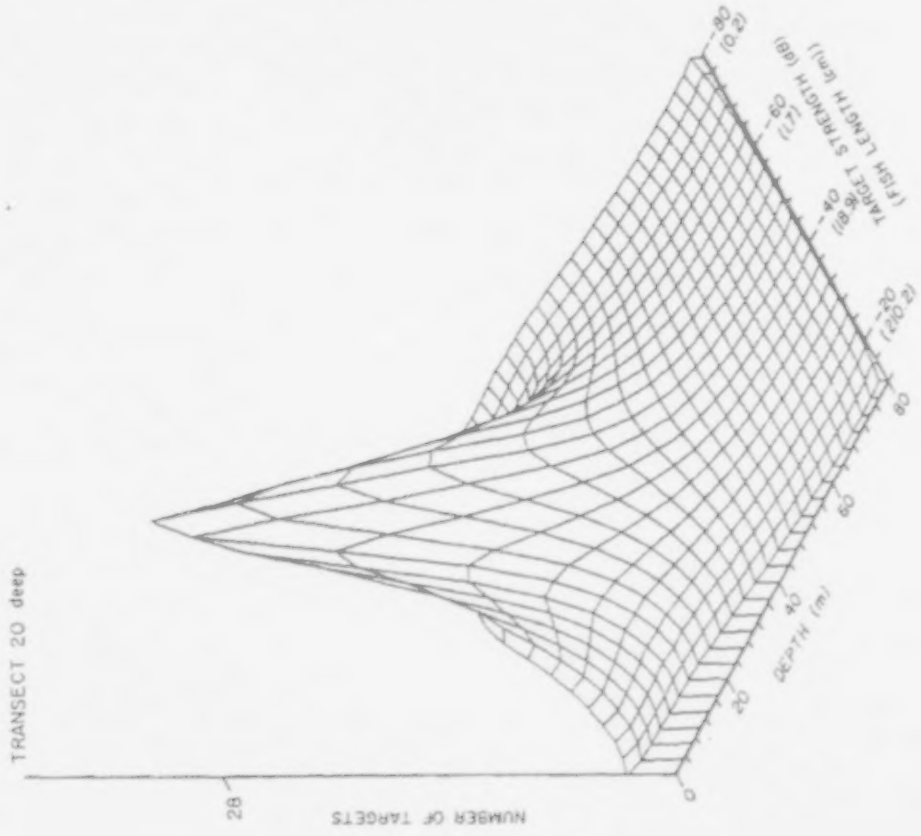

TRANSECT 18
NUMBER OF TARGETS
25
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(fish LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (16.8)
-20 (210.2)

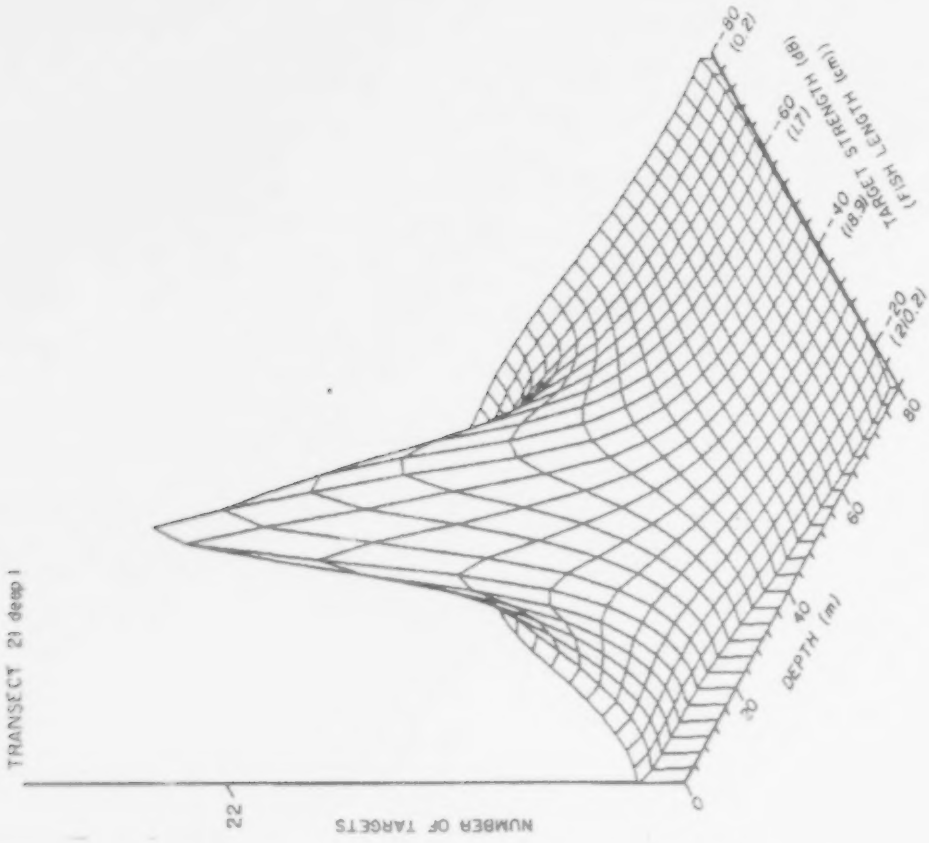

TRANSECT 17 shallow
NUMBER OF TARGETS
22
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
(fish LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (16.8)
-20 (210.2)

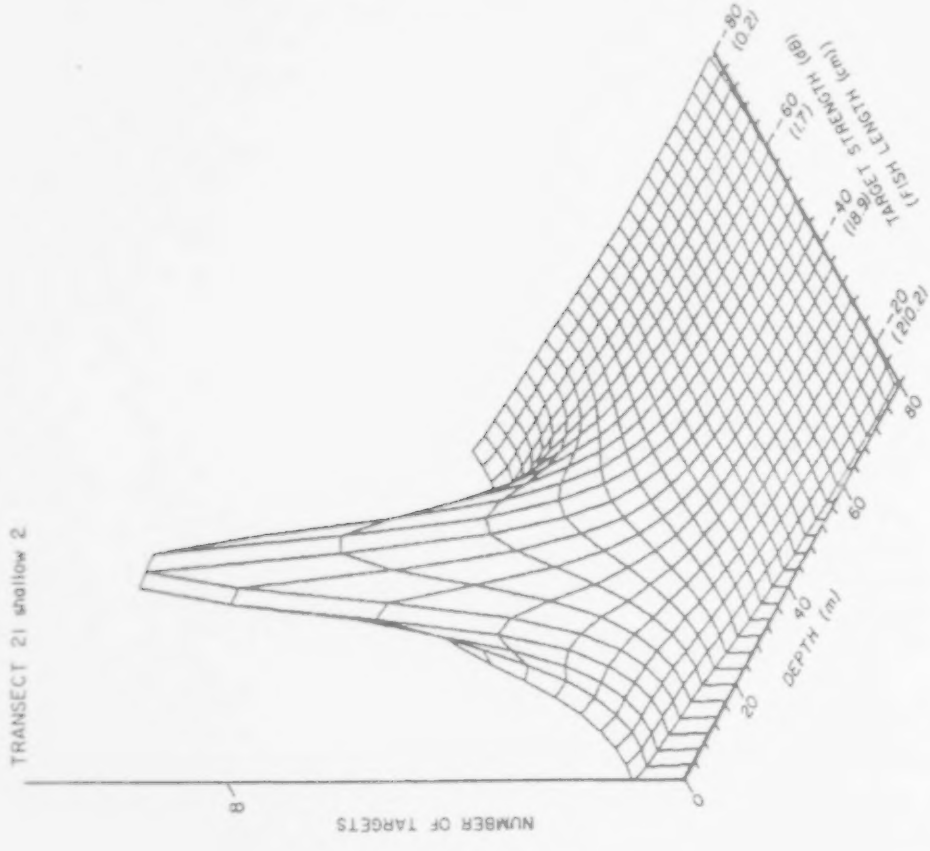

TRANSECT 20 shallow
NUMBER OF TARGETS
9
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
-80 (0.2)
-60 (1.7)
-40 (6.8)
-20 (20.2)
FISH LENGTH (cm)

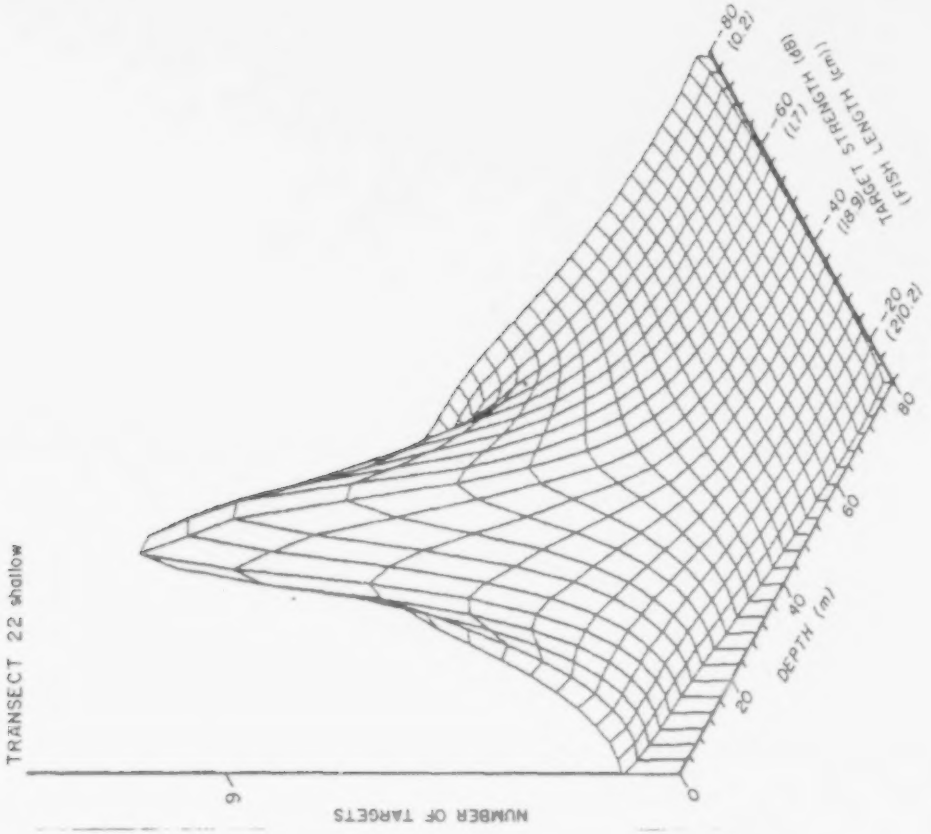

TRANSECT 19 shallow
NUMBER OF TARGETS
14
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
-80 (0.2)
-60 (1.7)
-40 (6.8)
-20 (20.2)
FISH LENGTH (cm)

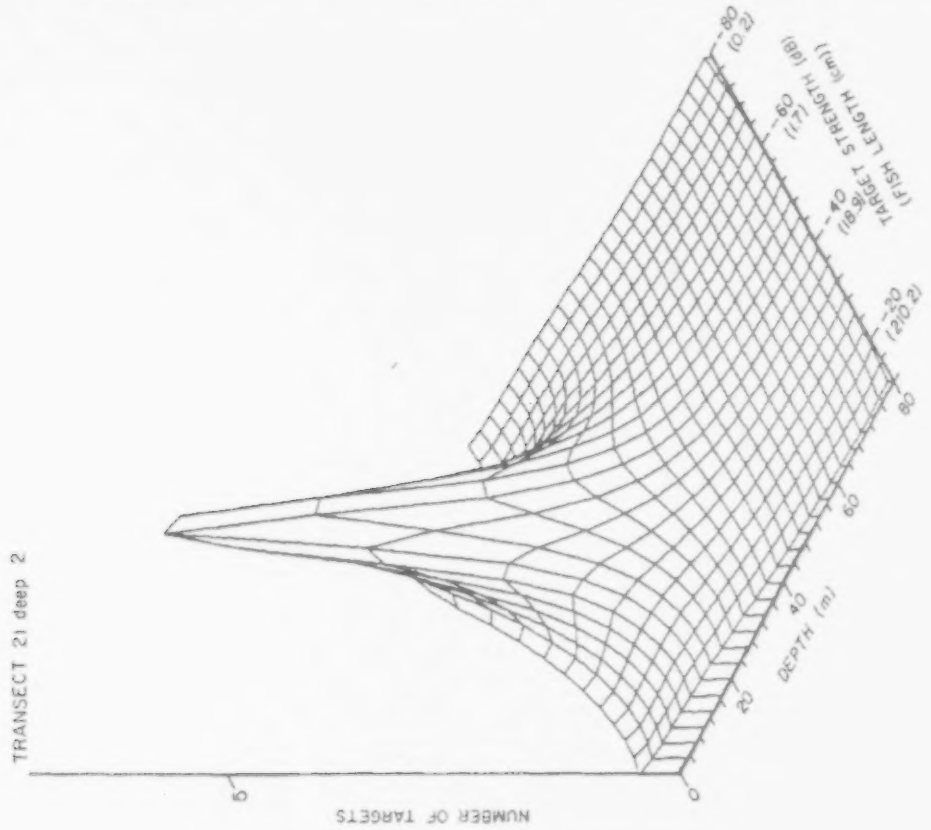

TRANSECT 21 shallow 1
NUMBER OF TARGETS
0
5
DEPTH (m)
0
20
40
60
80
TARGET STRENGTH (dB)
-80 (0.2)
-60 (1.7)
-40 (6.8)
-20 (20.2)
TARGET LENGTH (cm)

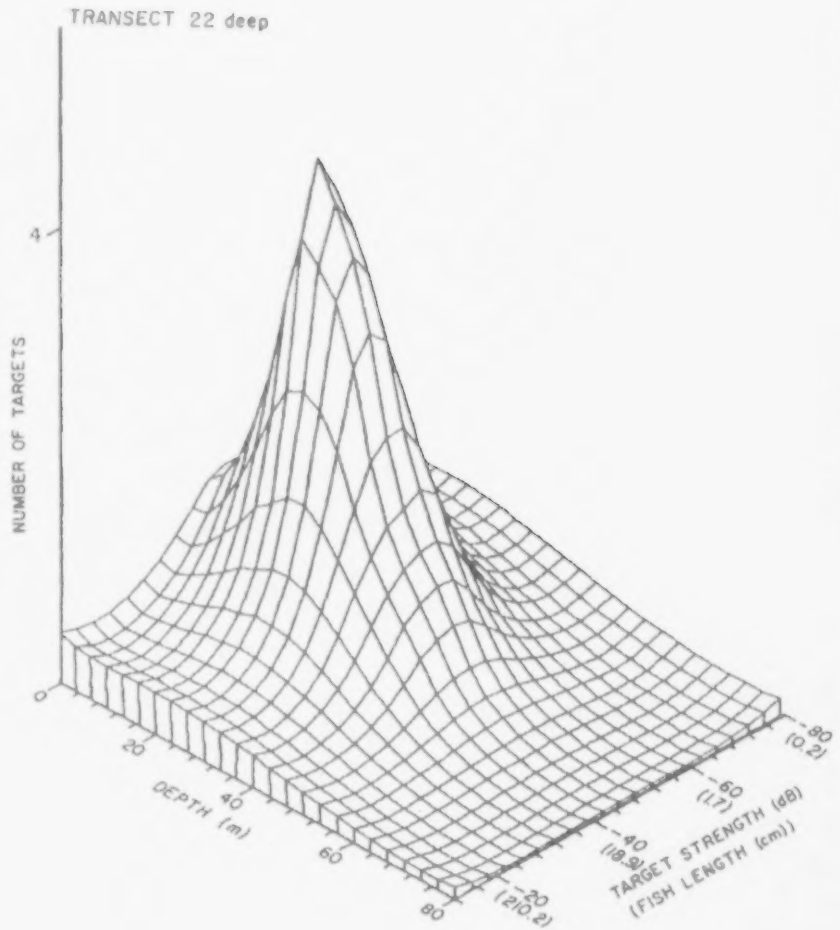

TRANSECT 20 deep
NUMBER OF TARGETS
0
28
DEPTH (m)
0
20
40
60
80
TARGET STRENGTH (dB)
-80 (0.2)
-60 (1.7)
-40 (6.8)
-20 (20.2)
TARGET LENGTH (cm)

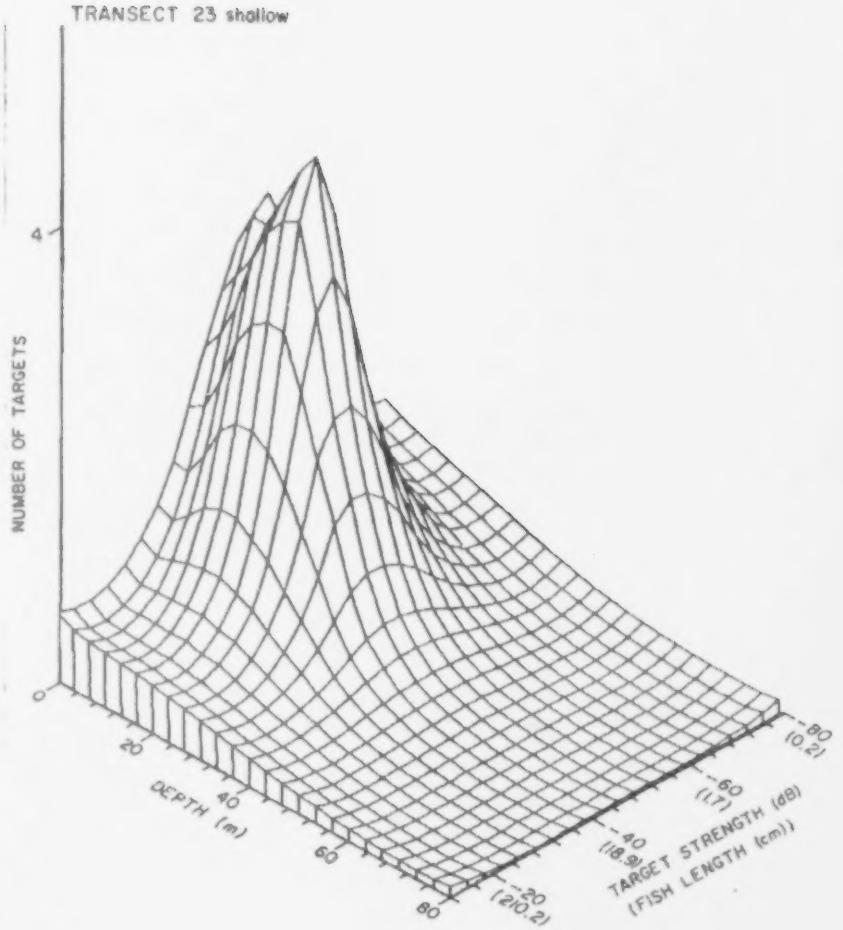

TRANSECT 21 deep 1
NUMBER OF TARGETS
22
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (6.8)
-20 (210.2)

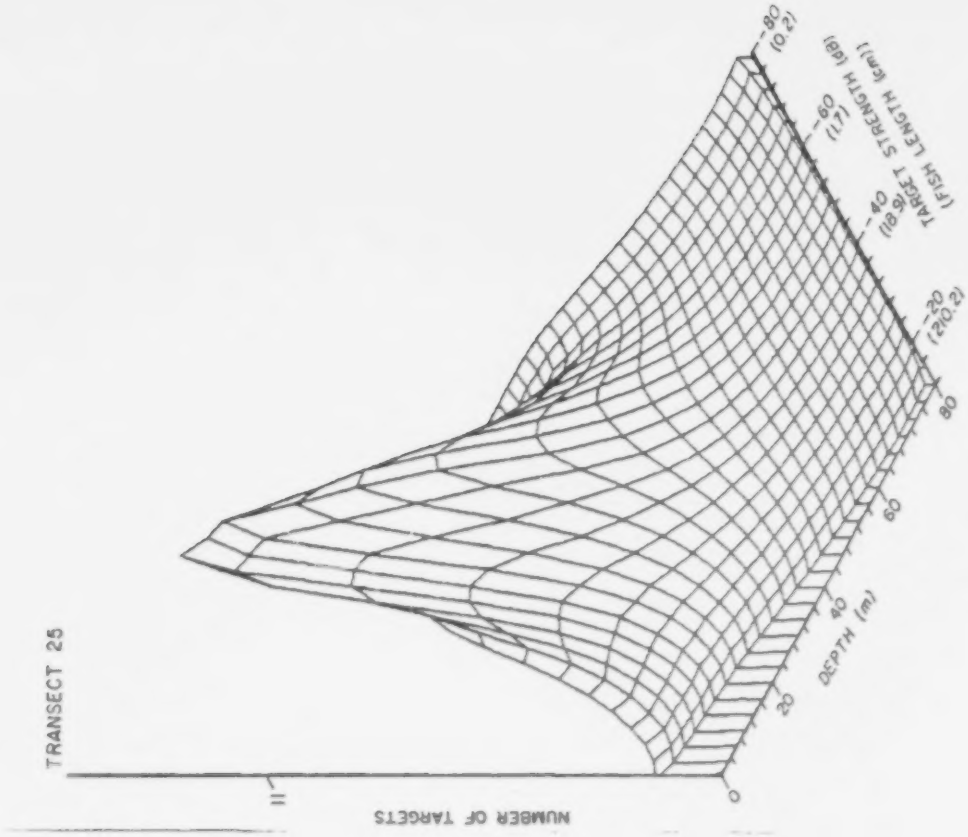

TRANSECT 21 shallow 2
NUMBER OF TARGETS
8
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (6.8)
-20 (210.2)

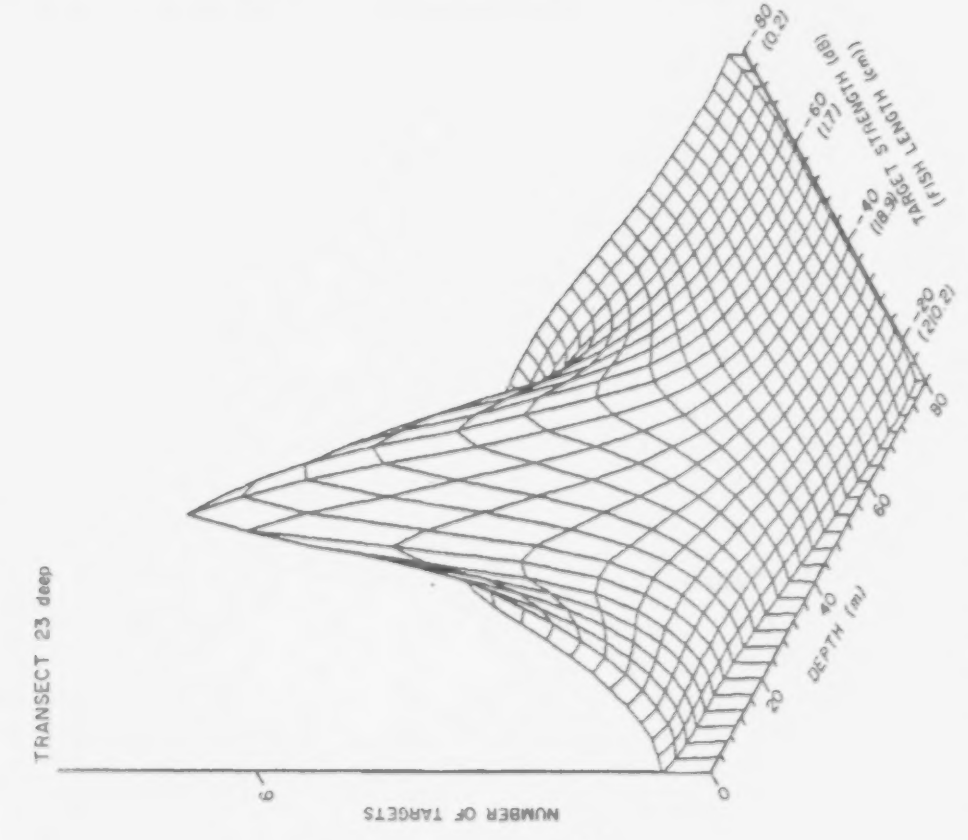

TRANSECT 22 shallow
NUMBER OF TARGETS
9
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (10.2)
-60 (1.7)
-40 (18.8)
-20 (210.2)

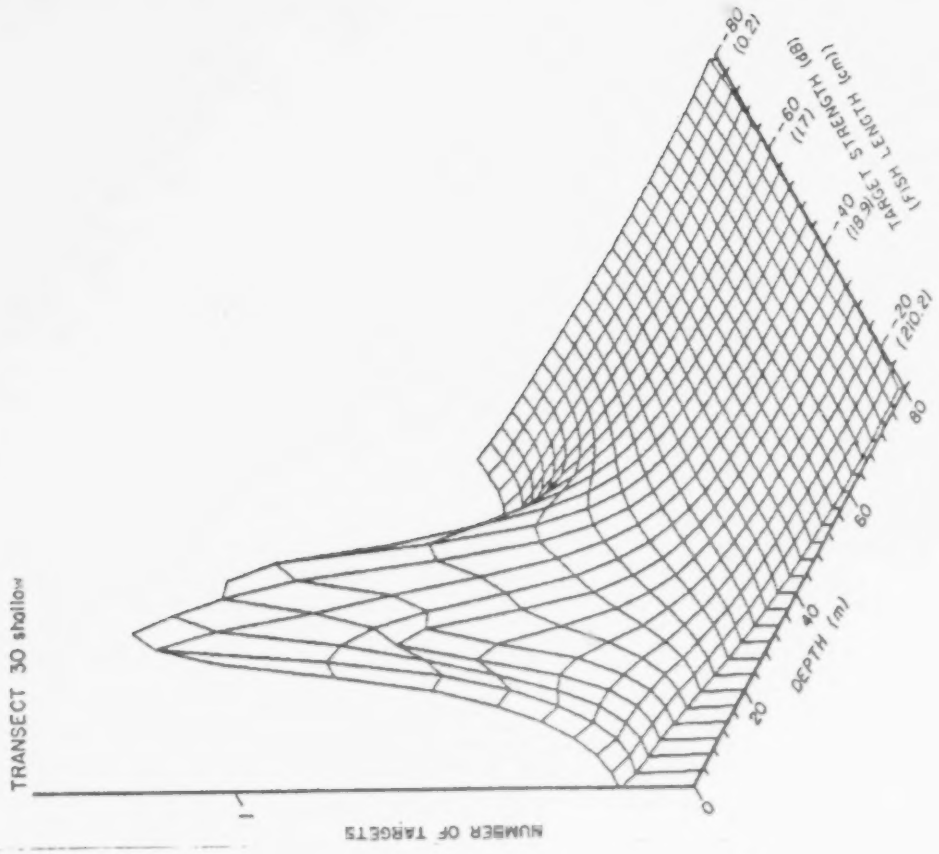

TRANSECT 21 deep 2
NUMBER OF TARGETS
5
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (10.2)
-60 (1.7)
-40 (18.8)
-20 (210.2)

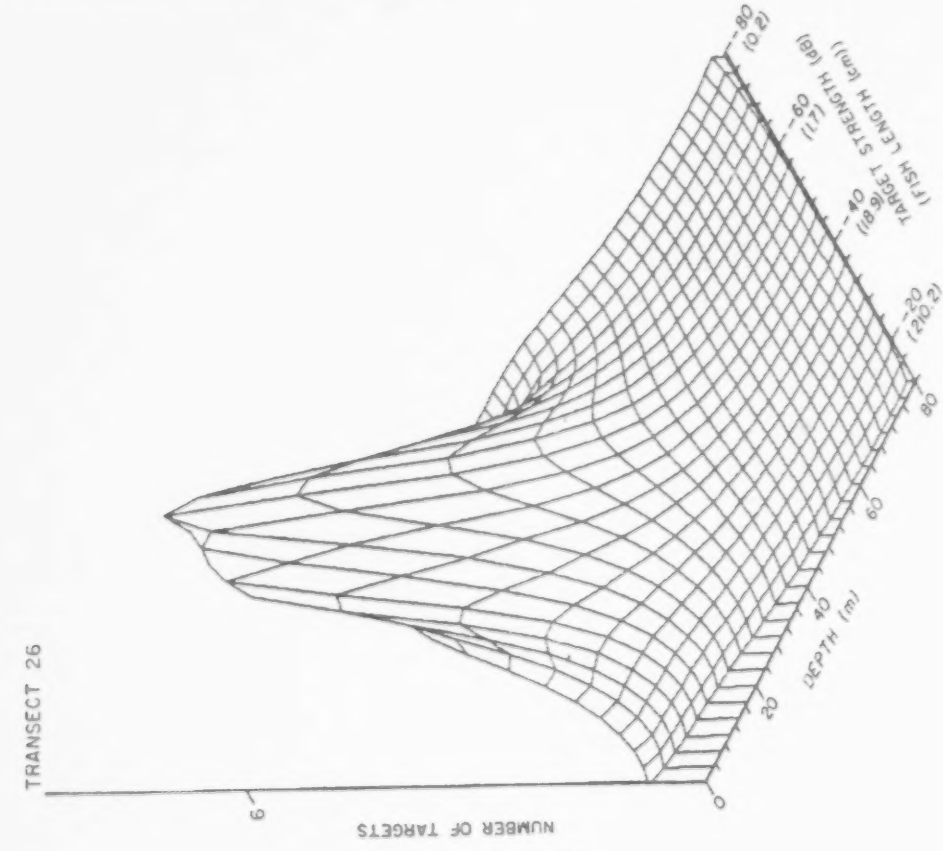

TRANSECT 22 deep
NUMBER OF TARGETS
4
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.2)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

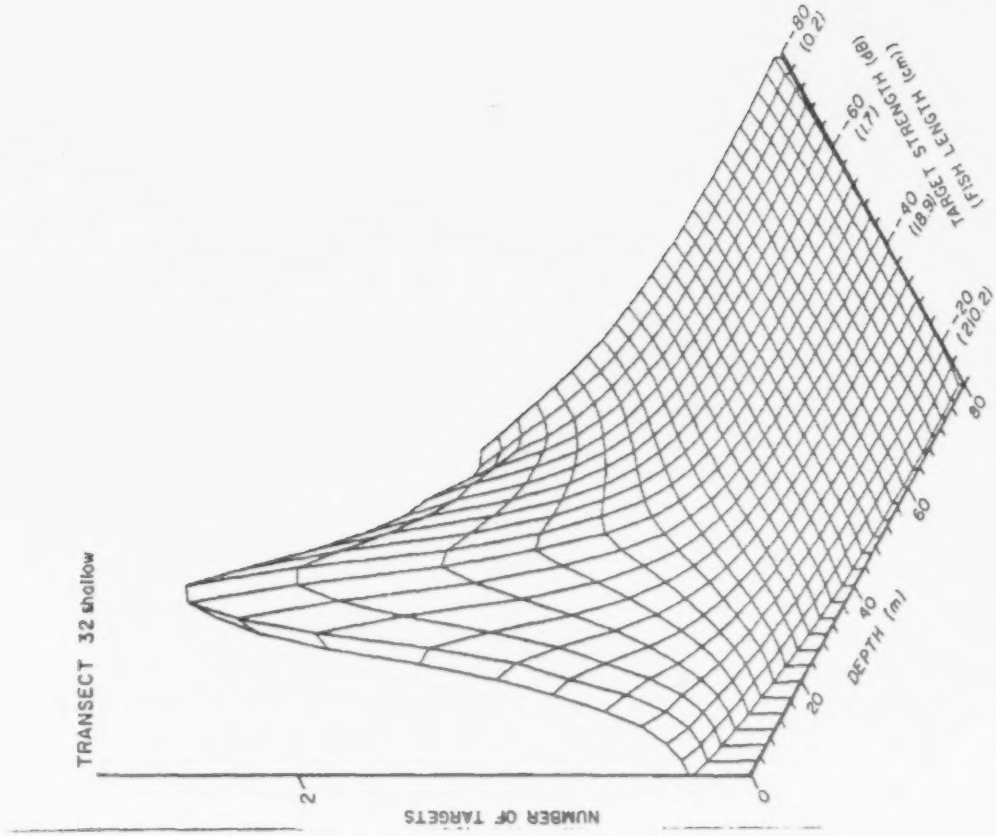

TRANSECT 23 shallow
NUMBER OF TARGETS
4
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.2)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

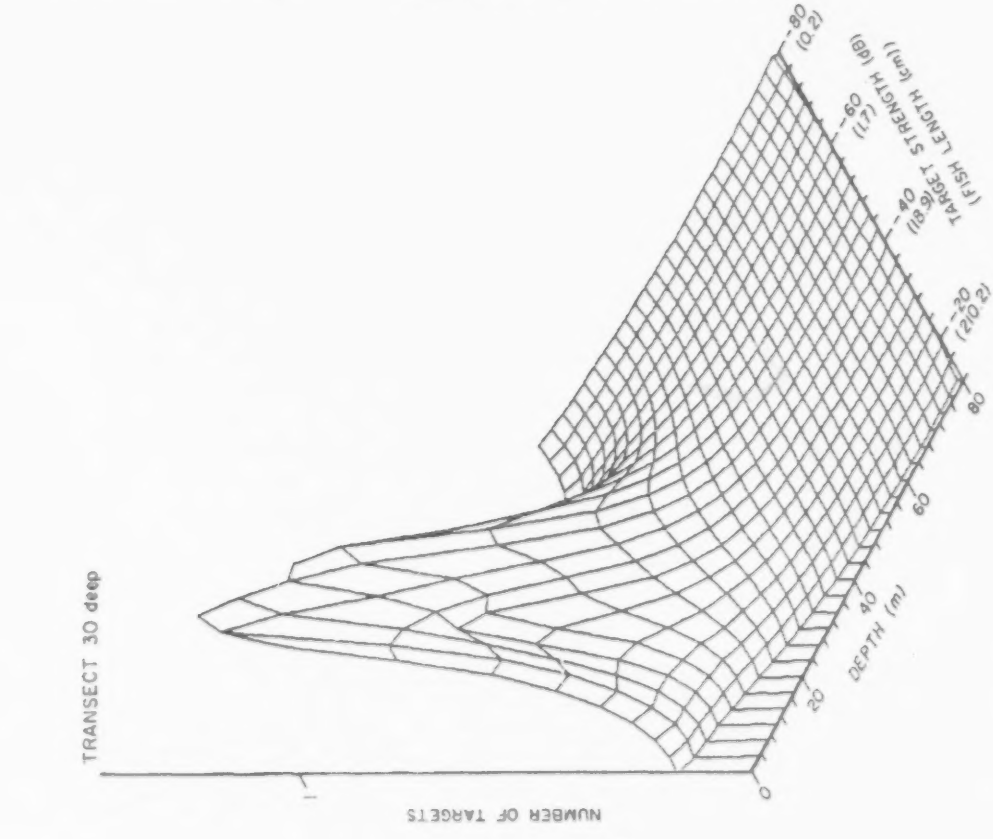

TRANSECT 25
NUMBER OF TARGETS
DEPTH (m)
TARGET STRENGTH (dB)
FISH LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (6.8)
-20 (27.2)
0
20
40
60
80

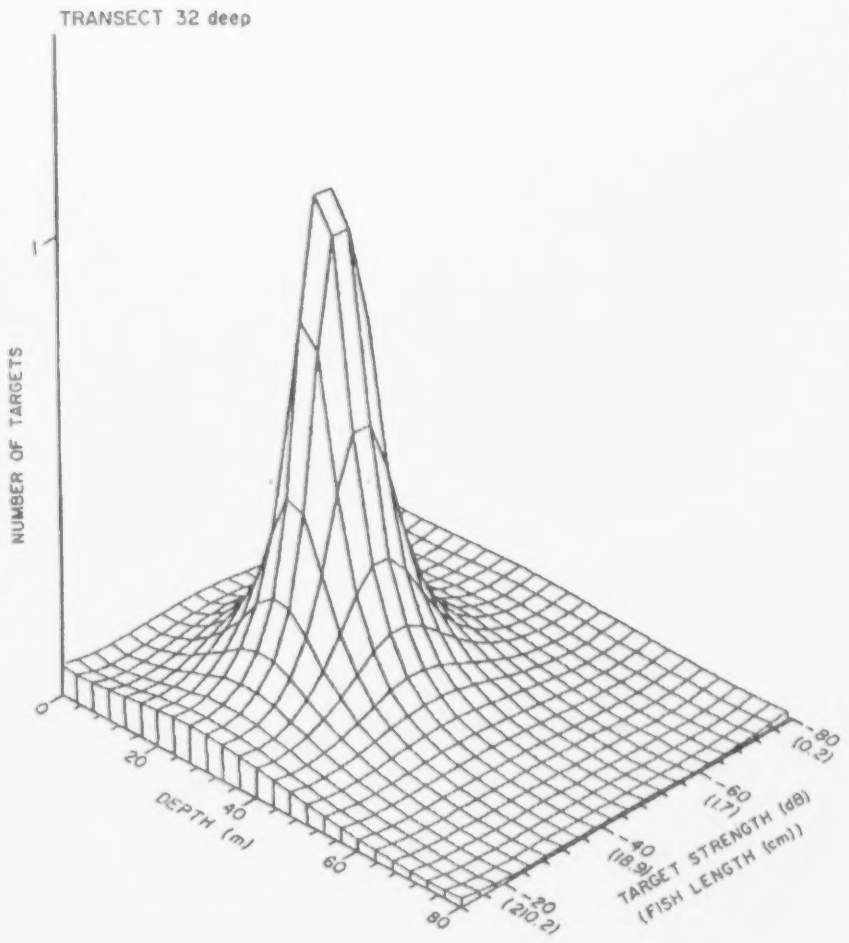

TRANSECT 23 deep
NUMBER OF TARGETS
DEPTH (m)
TARGET STRENGTH (dB)
FISH LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (6.8)
-20 (27.2)
0
20
40
60
80

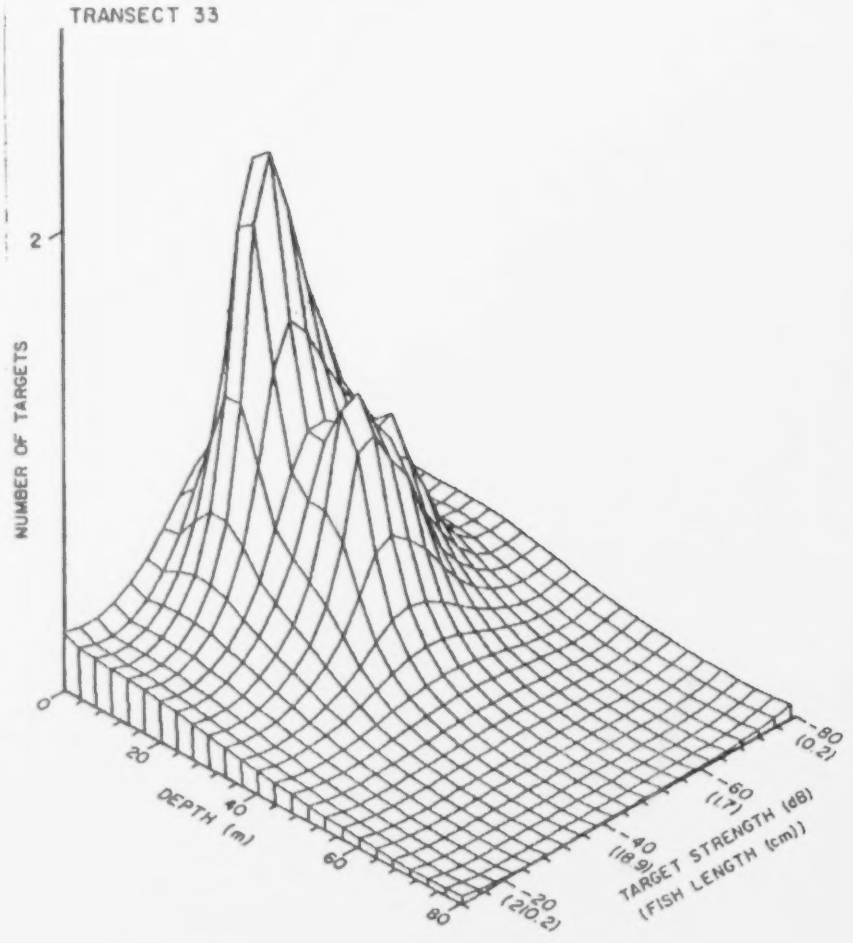

TRANSECT 30 shallow
NUMBER OF TARGETS
1
0
20
40
60
80
DEPTH (m)
-80 (10.2)
-60 (17)
-40 (18.8)
-20 (210.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

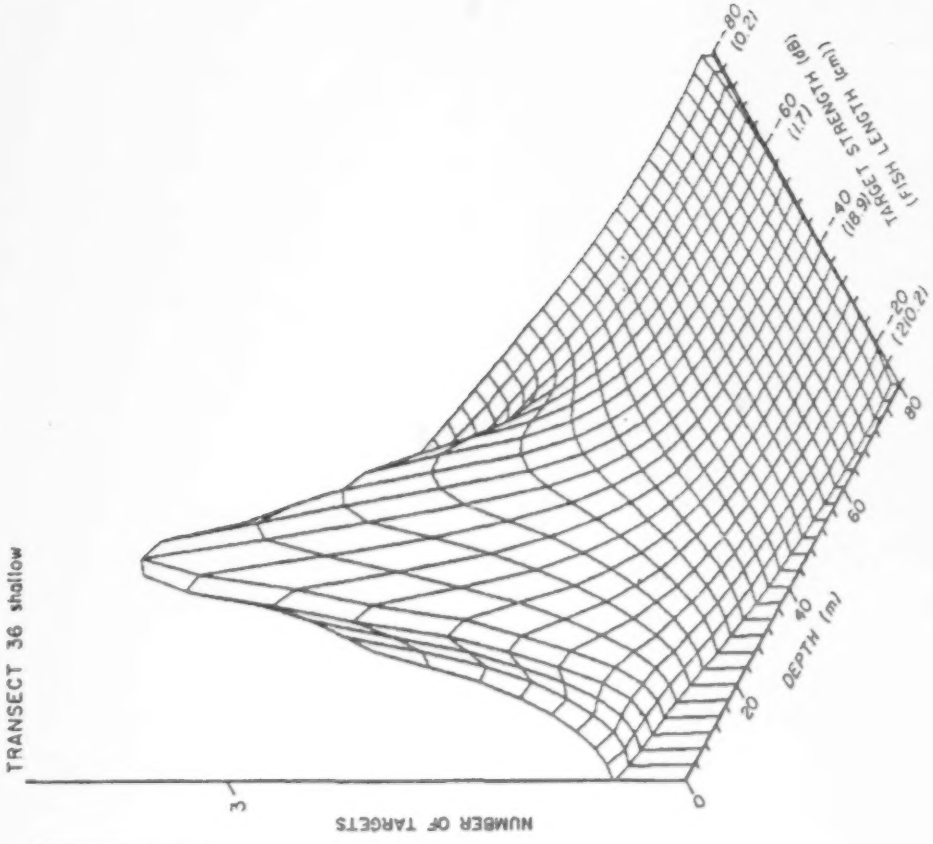

TRANSECT 26
NUMBER OF TARGETS
6
0
20
40
60
80
DEPTH (m)
-80 (10.2)
-60 (17)
-40 (18.8)
-20 (210.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

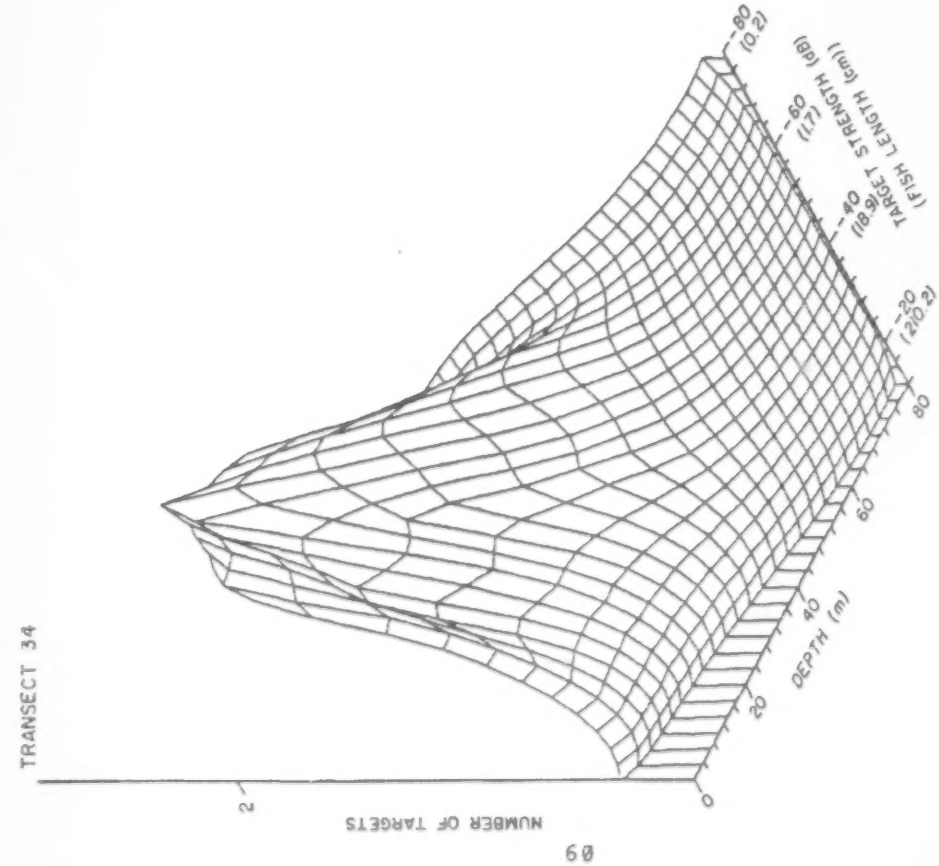

TRANSECT 32 shallow
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)

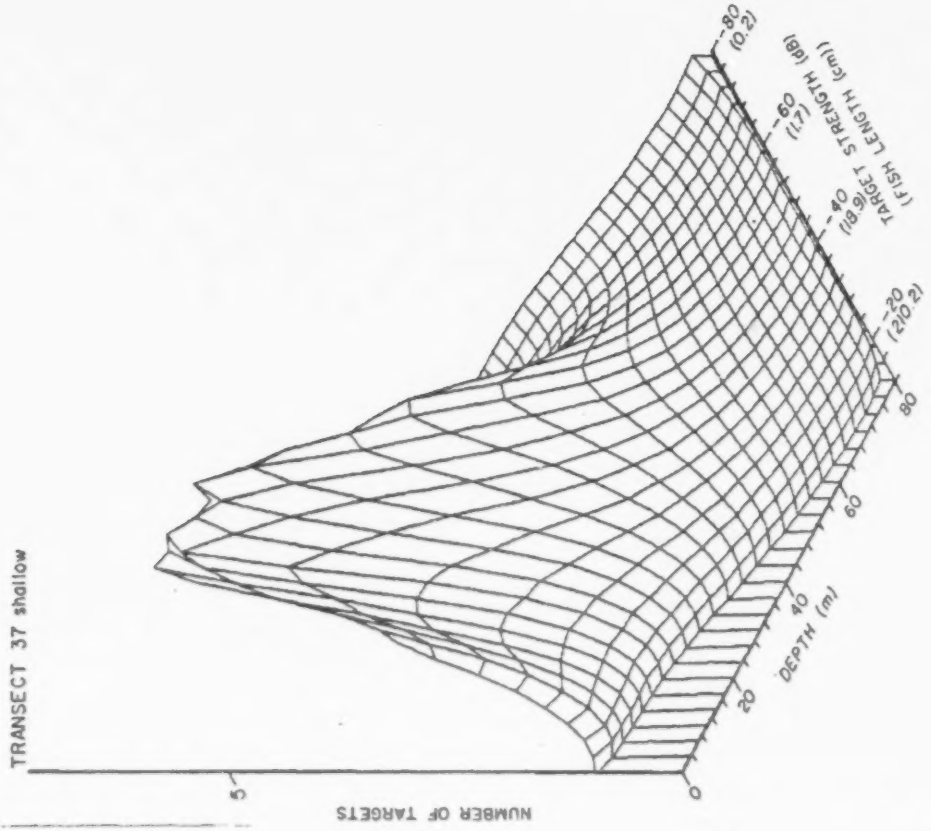

TRANSECT 30 deep
NUMBER OF TARGETS
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)

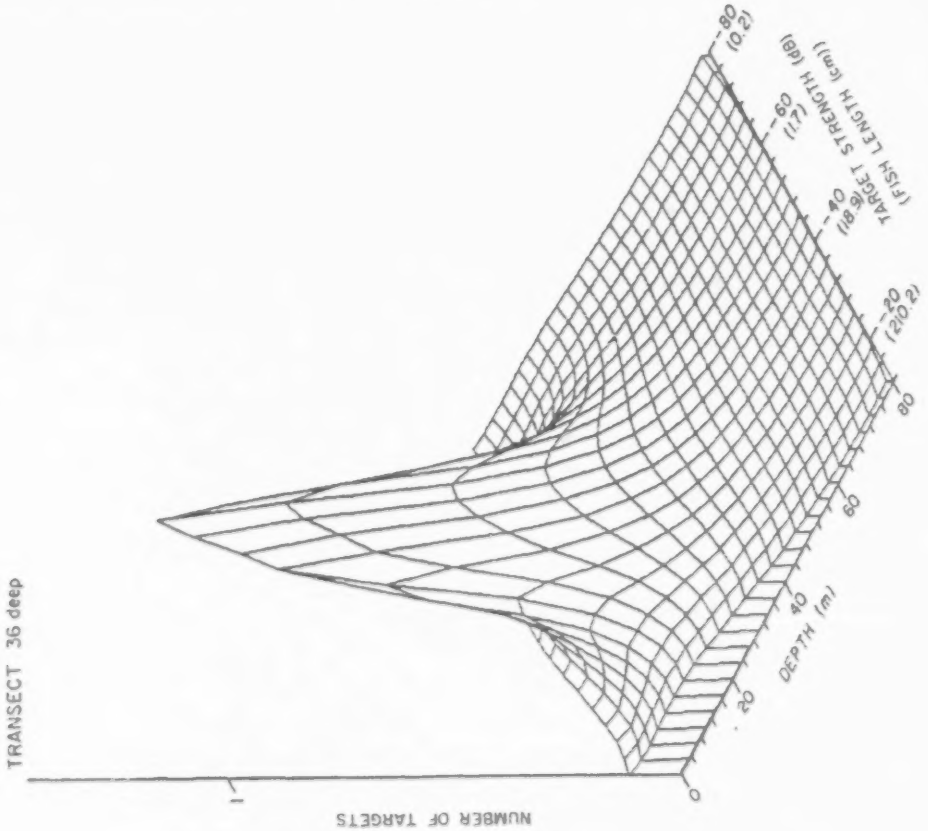

TRANSECT 32 deep
NUMBER OF TARGETS
1
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

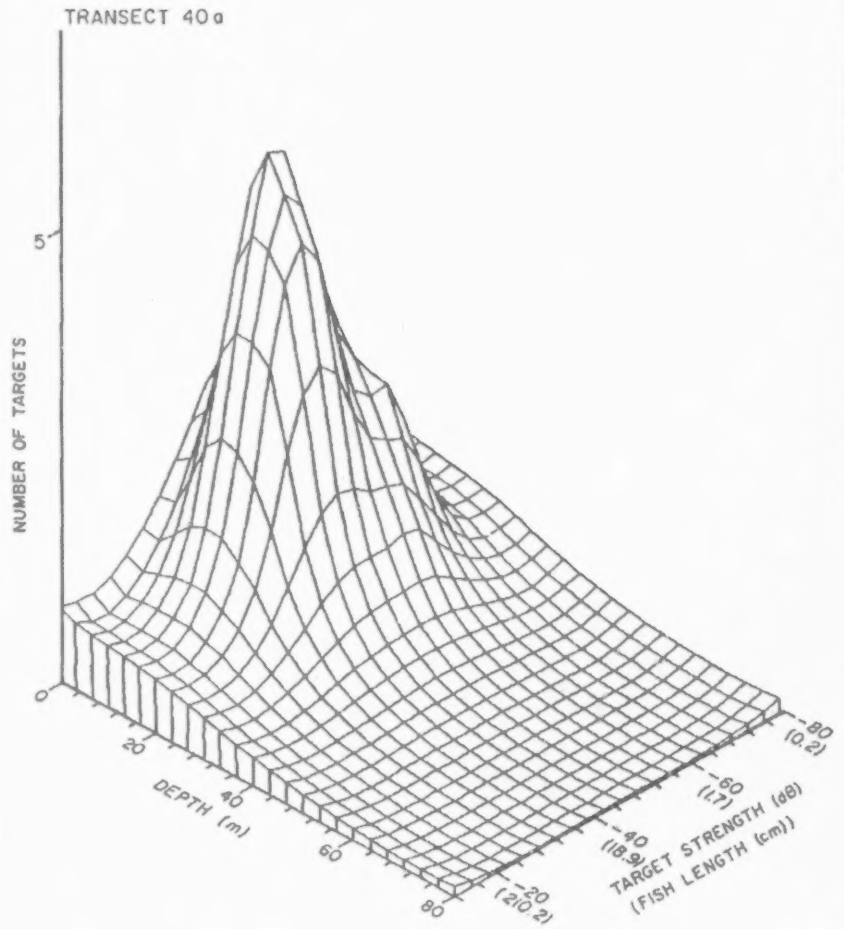

TRANSECT 33
NUMBER OF TARGETS
2
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(118.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

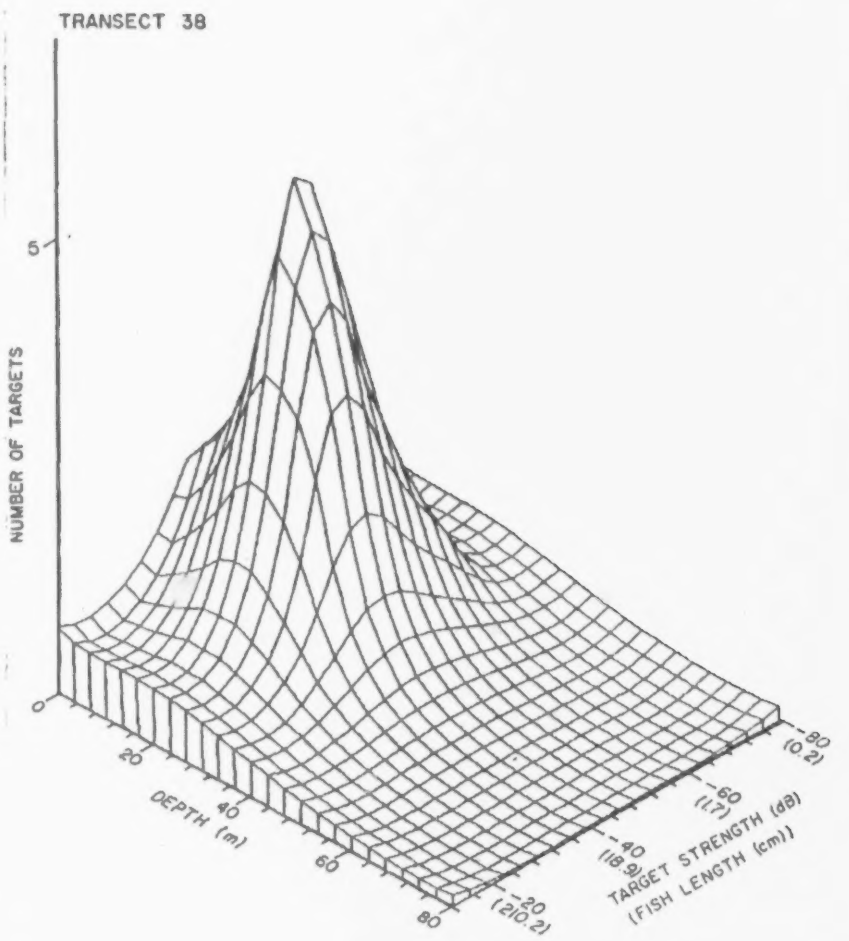

TRANSECT 36 shallow
NUMBER OF TARGETS
3
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
-80 (0.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)
FISH LENGTH (cm)

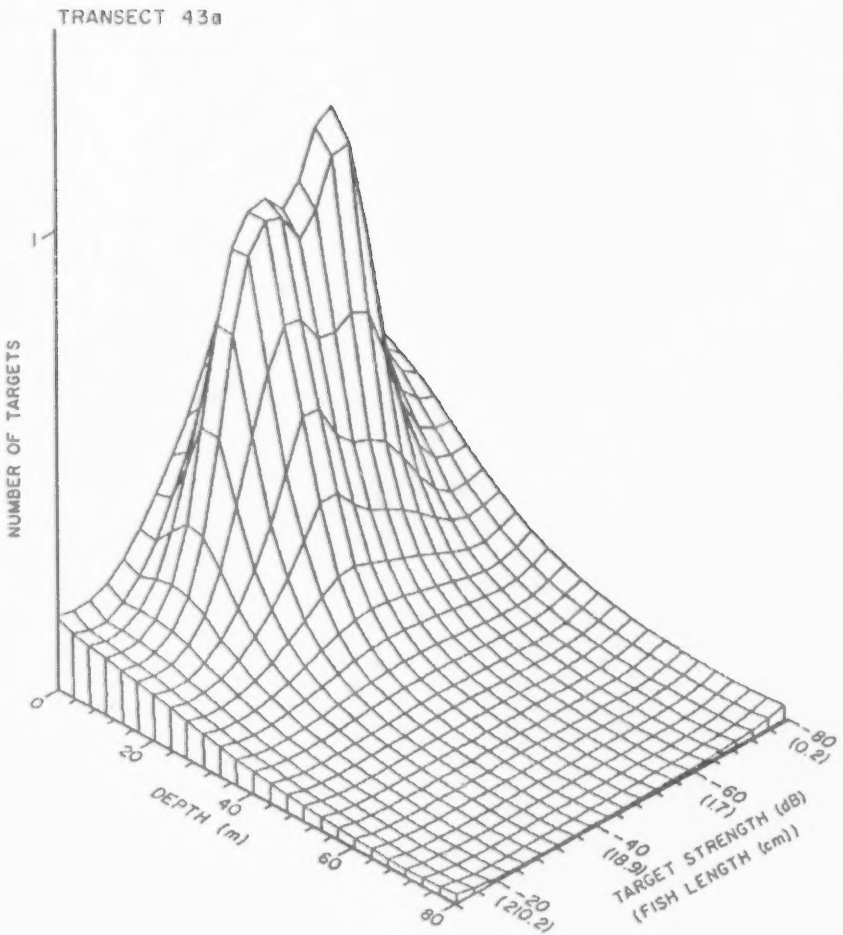

TRANSECT 34
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
-80 (0.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)
FISH LENGTH (cm)

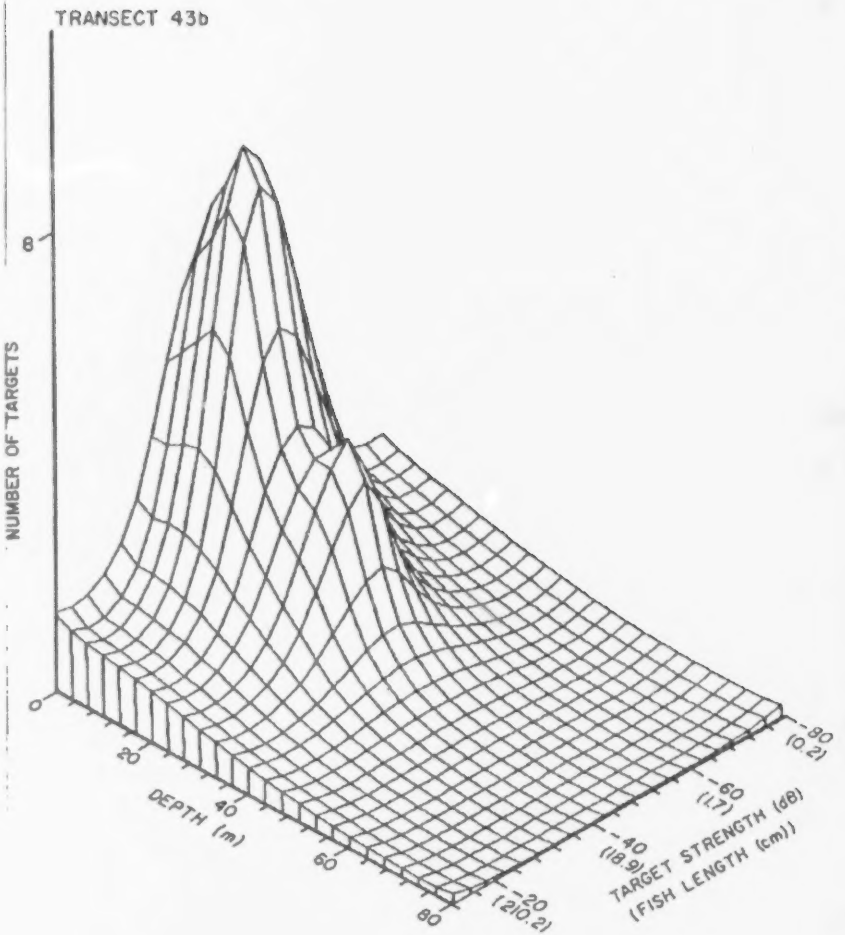

TRANSECT 37 shallow
NUMBER OF TARGETS
5
DEPTH (m)
0
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (10.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)

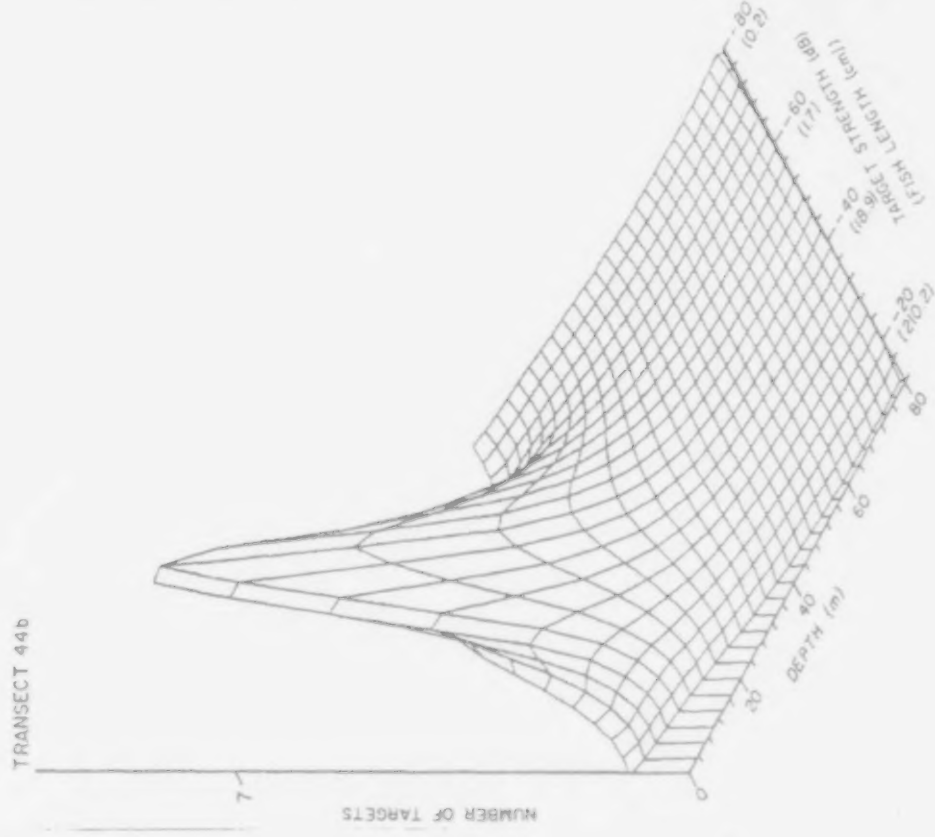

TRANSECT 36 deep
NUMBER OF TARGETS
1
DEPTH (m)
0
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (10.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)

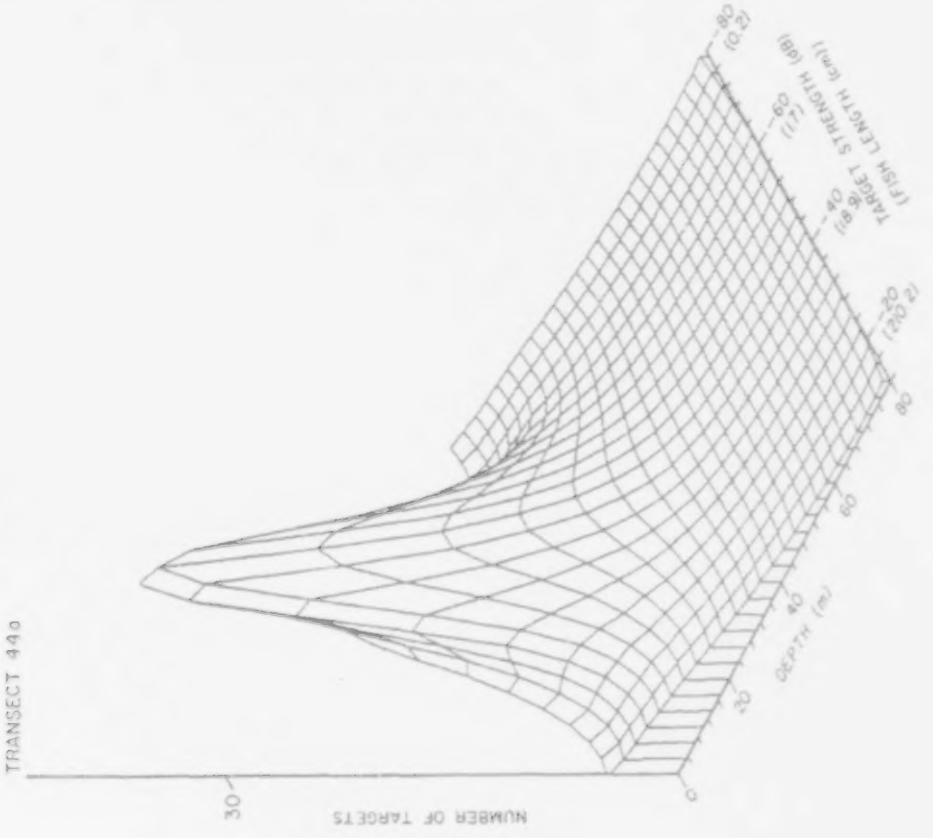

TRANSECT 40a
NUMBER OF TARGETS
5
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

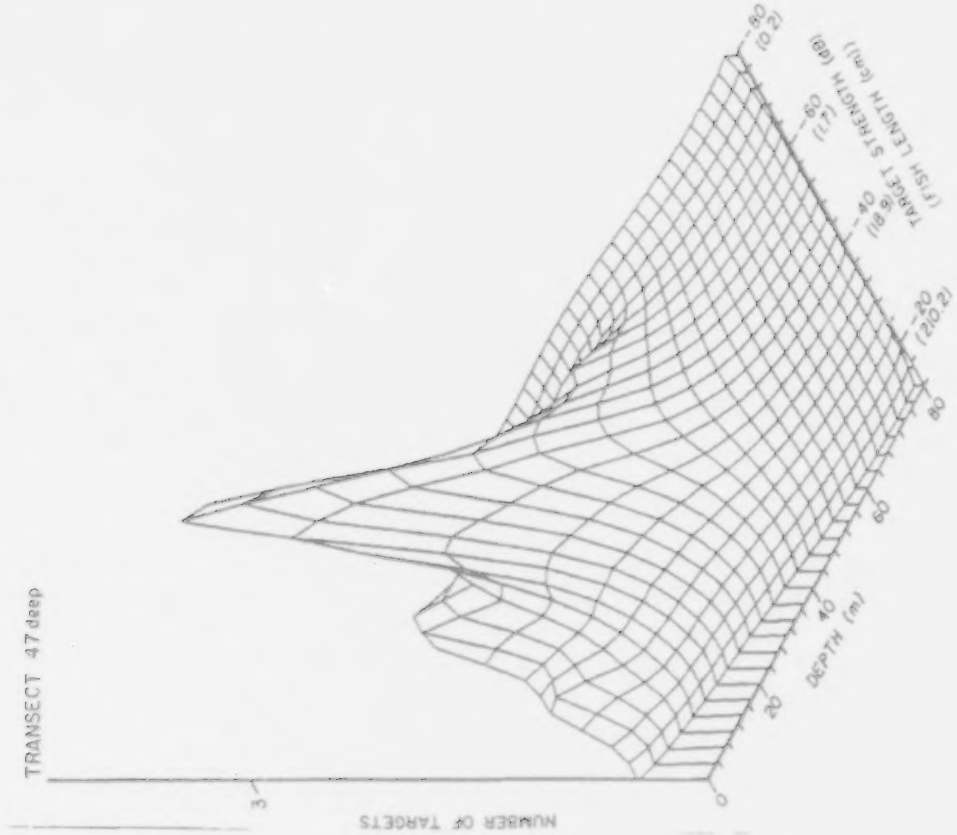

TRANSECT 38
NUMBER OF TARGETS
5
0
20
DEPTH (m)
40
60
80
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

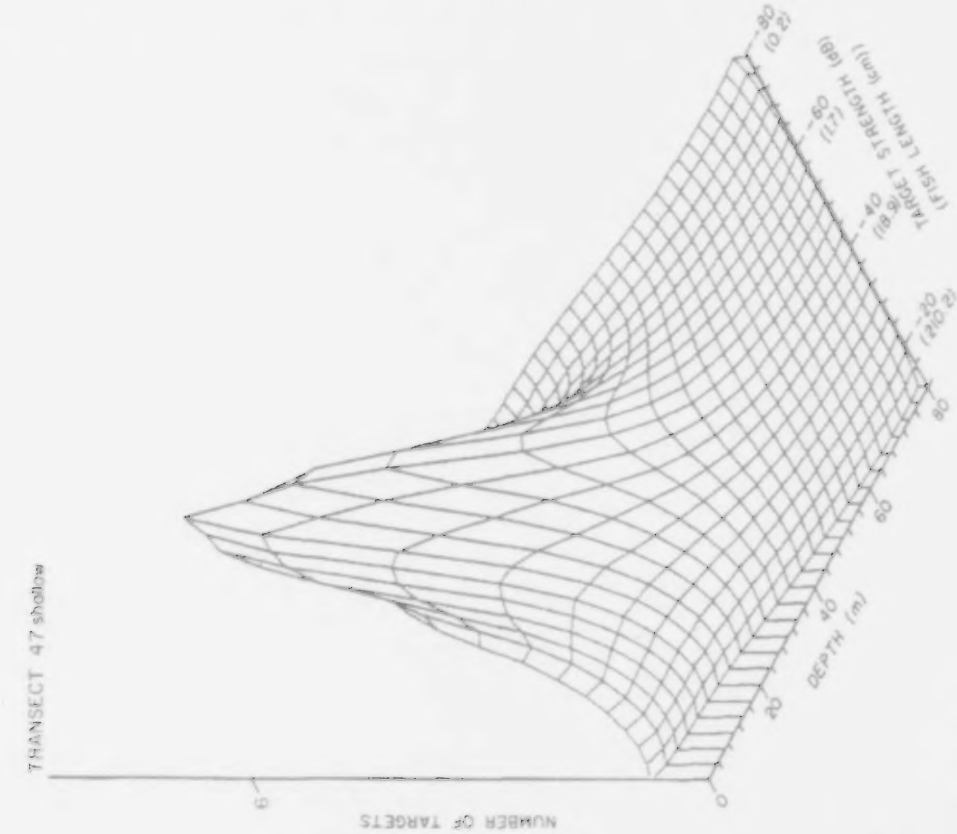

TRANSECT 43a
NUMBER OF TARGETS
1
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

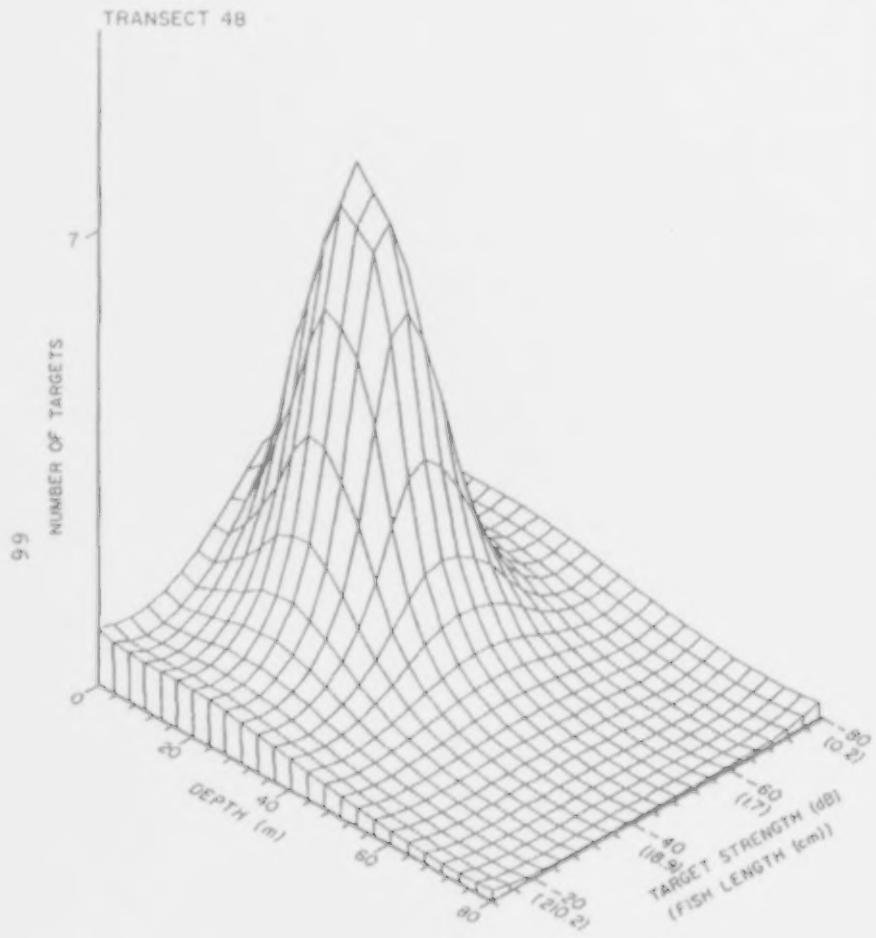

TRANSECT 43b
NUMBER OF TARGETS
8
0
20
40
60
80
DEPTH (m)
-20
(210.2)
-40
(18.9)
-60
(1.7)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

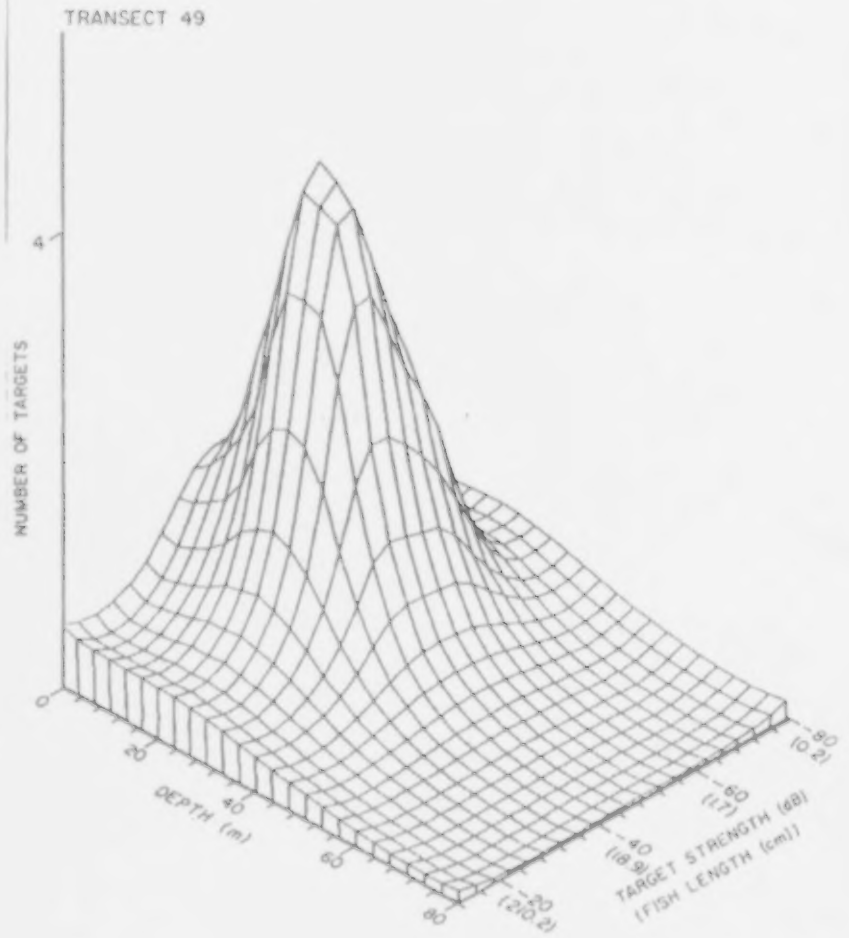

TRANSECT 44b
NUMBER OF TARGETS
7
0
DEPTH (m)
20
40
60
80
-20 (20.2)
-40 (14.8)
-60 (11.7)
-80 (10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

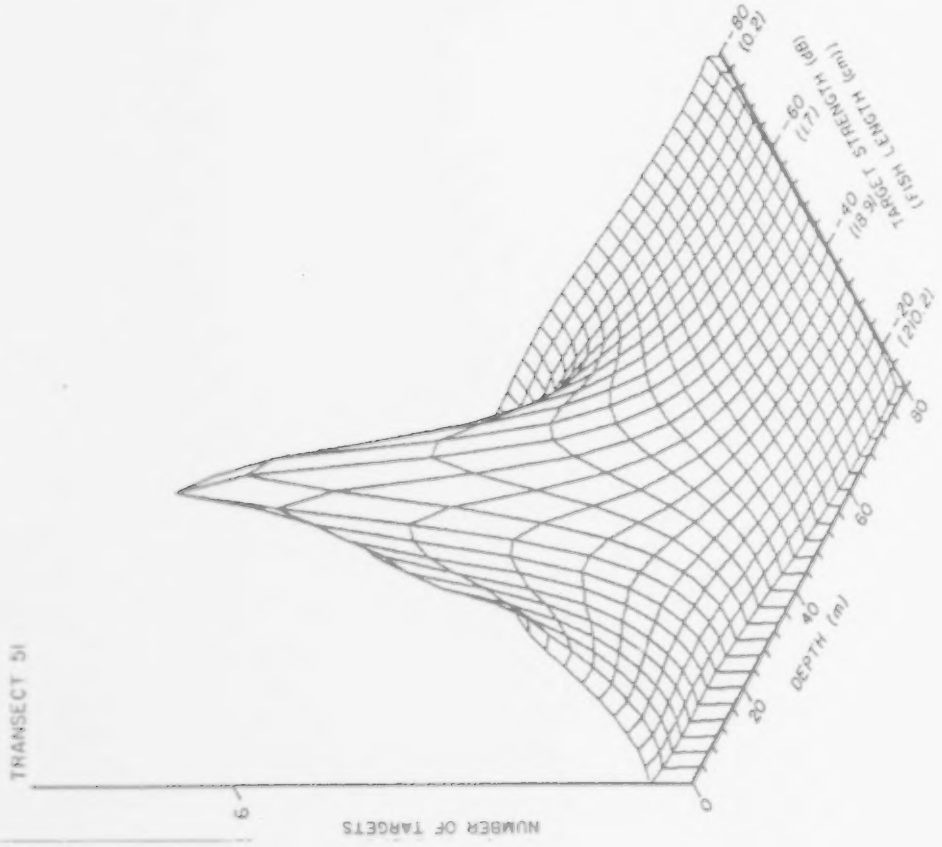

TRANSECT 44a
NUMBER OF TARGETS
30
0
DEPTH (m)
20
40
60
80
-20 (20.2)
-40 (14.8)
-60 (11.7)
-80 (10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

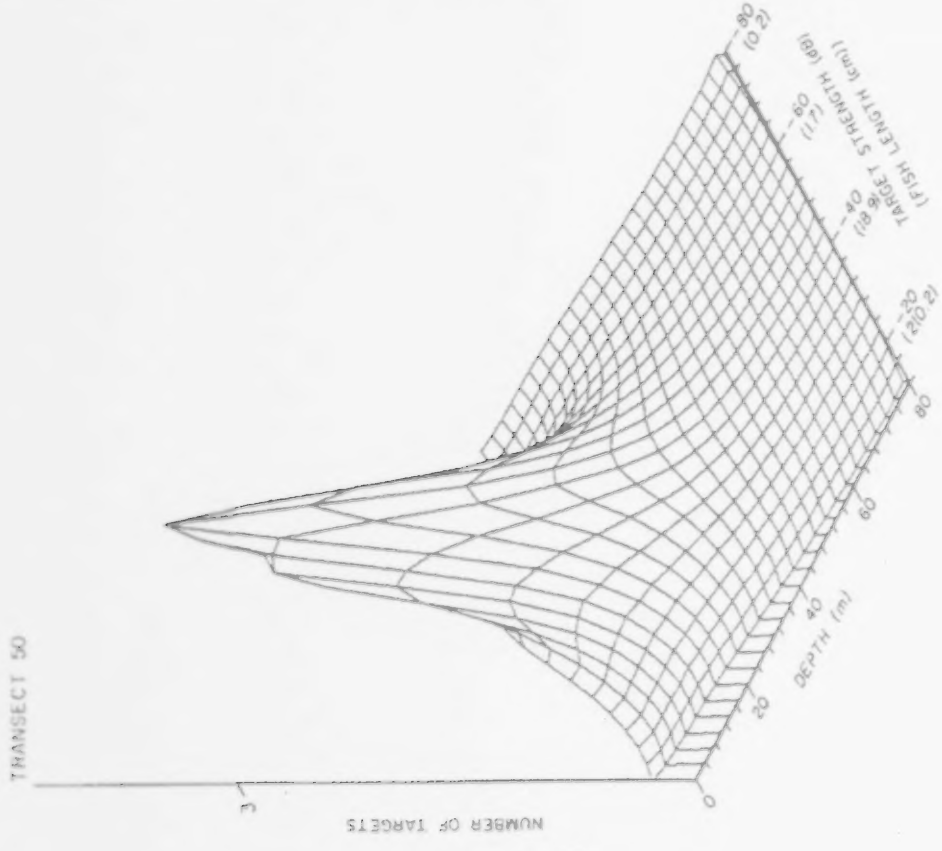

TRANSECT 47 deep
NUMBER OF TARGETS
3
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (8.8)
-20 (20.2)

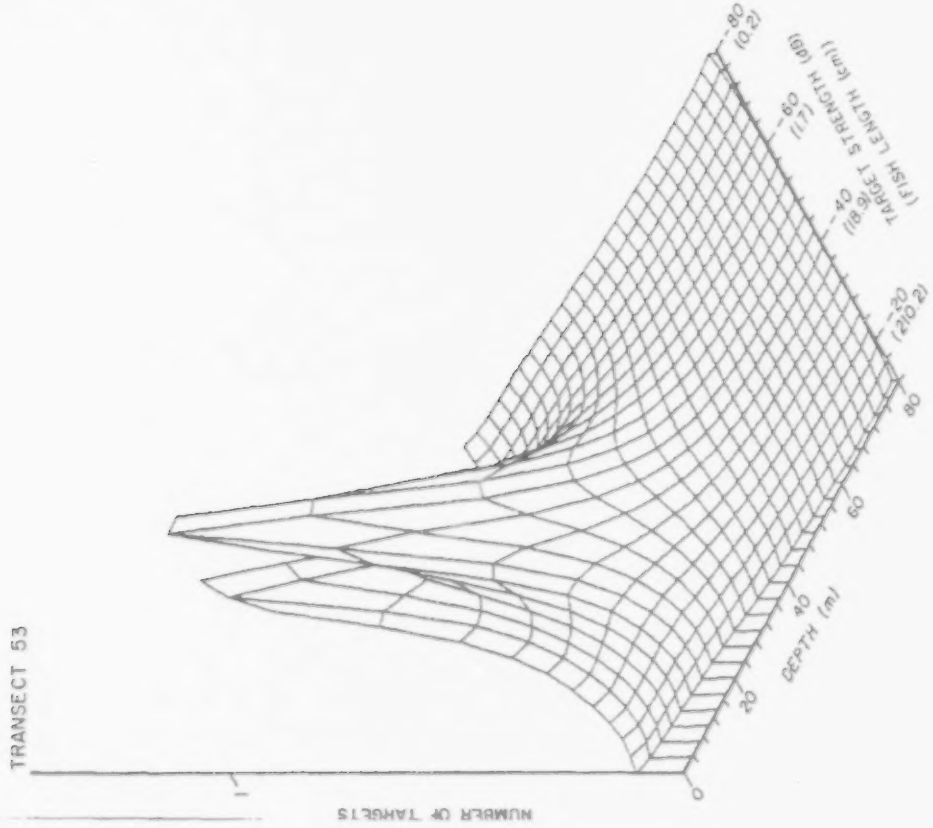

TRANSECT 47 shallow
NUMBER OF TARGETS
5
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (8.8)
-20 (20.2)

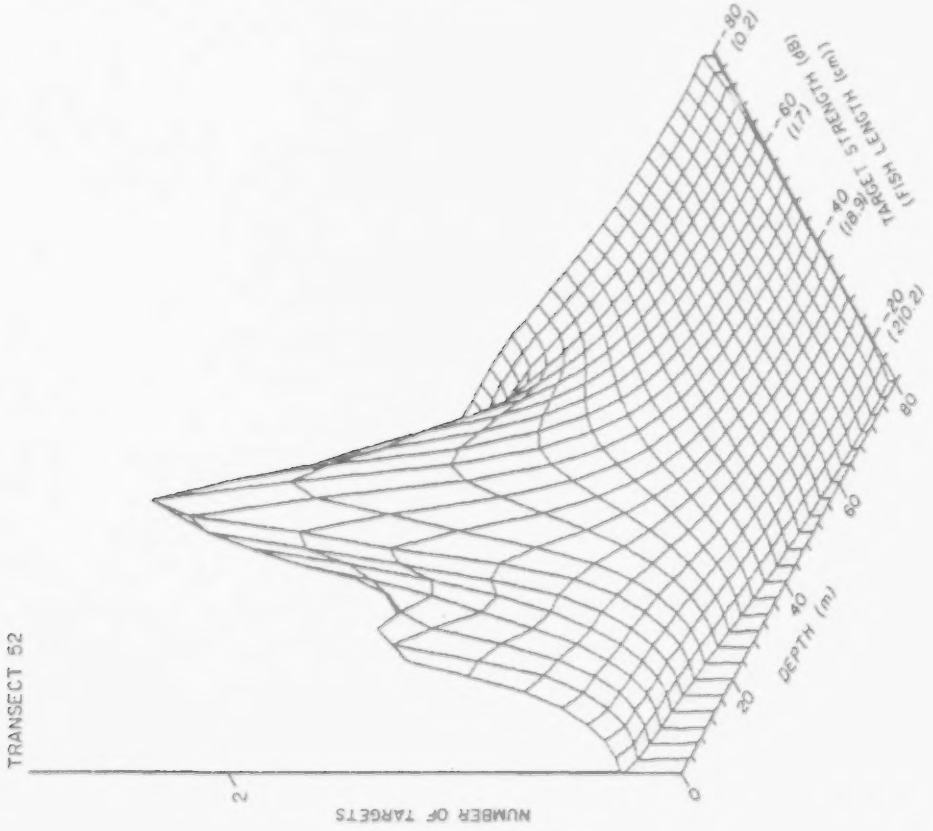

TRANSECT 48
NUMBER OF TARGETS
7
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (118.9)
-60 (1.7)
-80 (10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

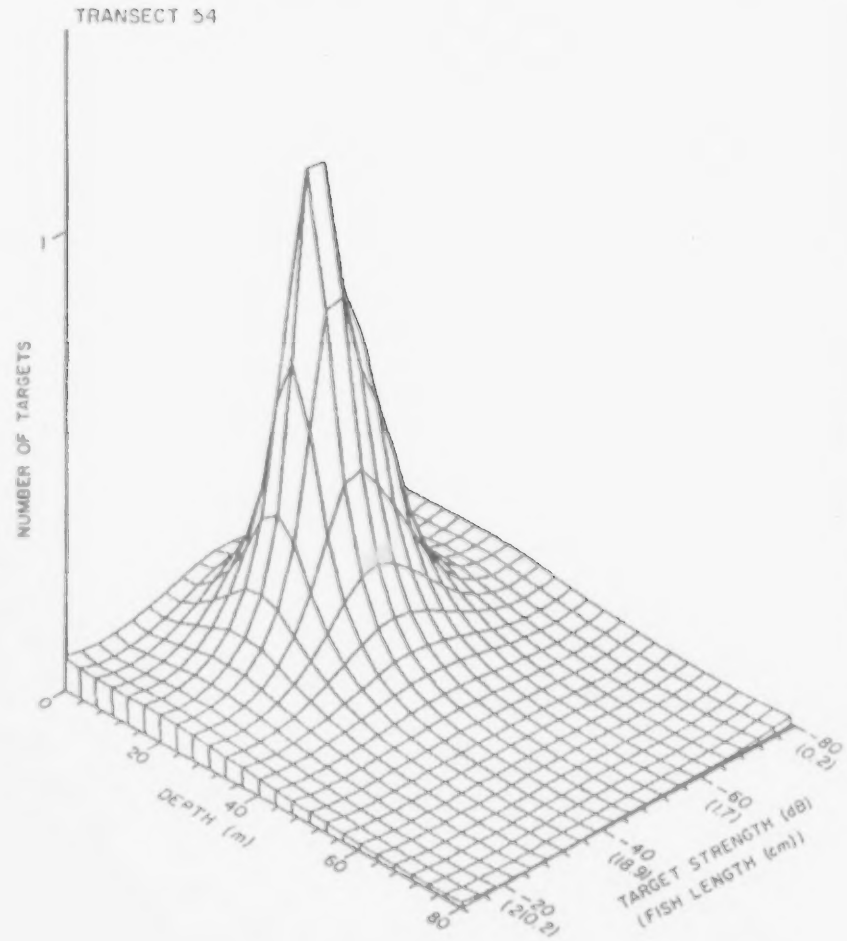

TRANSECT 49
NUMBER OF TARGETS
4
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (118.9)
-60 (1.7)
-80 (10.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

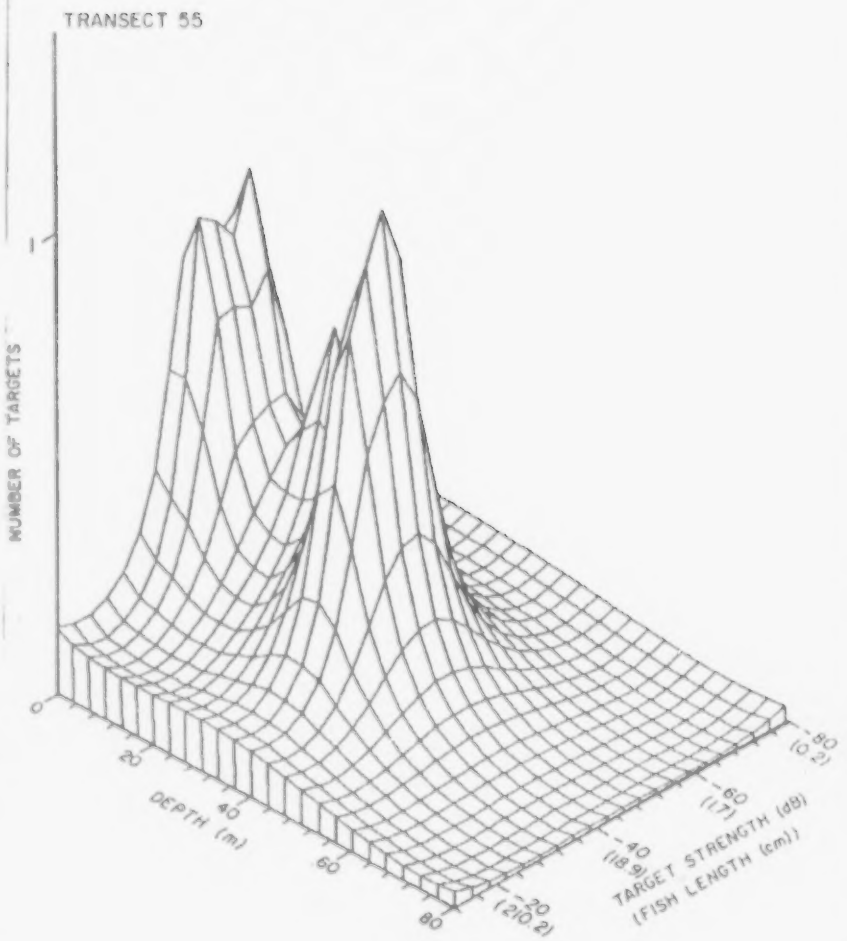

TRANSECT 51
NUMBER OF TARGETS
DEPTH (m)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (8.8)
-20 (20.2)
0
20
40
60
80
100

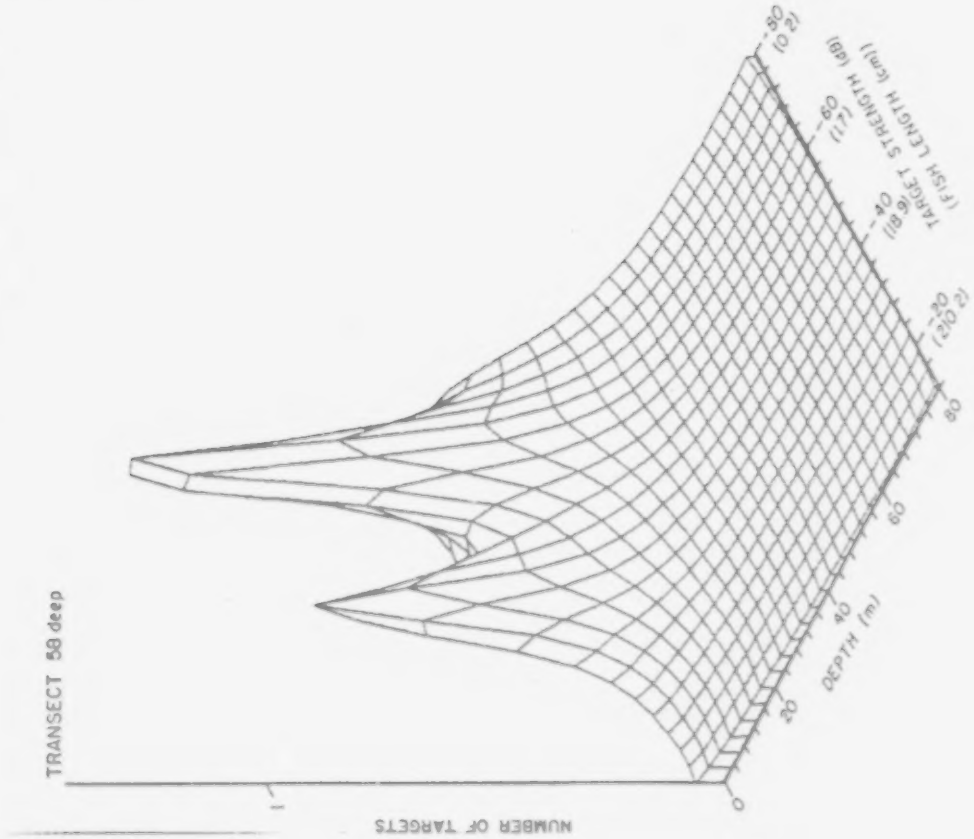

TRANSECT 50
NUMBER OF TARGETS
DEPTH (m)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))
-80 (0.2)
-60 (1.7)
-40 (8.8)
-20 (20.2)
0
20
40
60
80
100

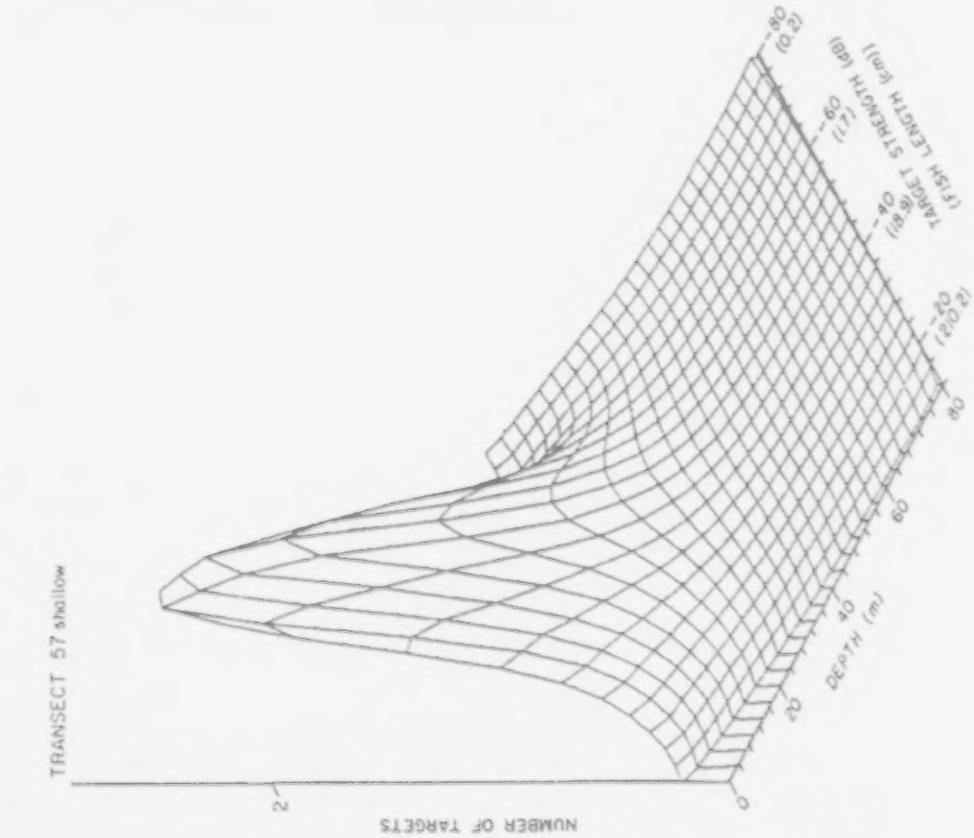

TRANSECT 53
NUMBER OF TARGETS
1
0
DEPTH (m)
20
40
60
80
-20 (-20.2)
-40 (-18.9)
-60 (-17)
-80 (-20.2)
TARGET STRENGTH (dB)
FISH LENGTH (m)

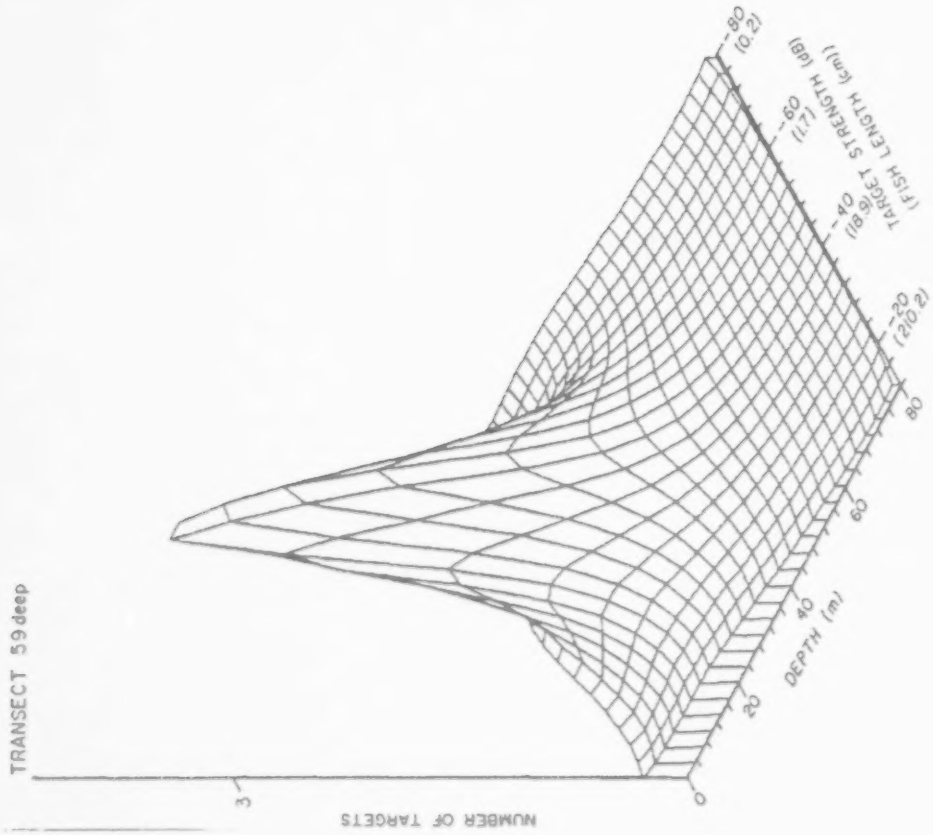

TRANSECT 52
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
-20 (-20.2)
-40 (-18.9)
-60 (-17)
-80 (-20.2)
TARGET STRENGTH (dB)
FISH LENGTH (m)

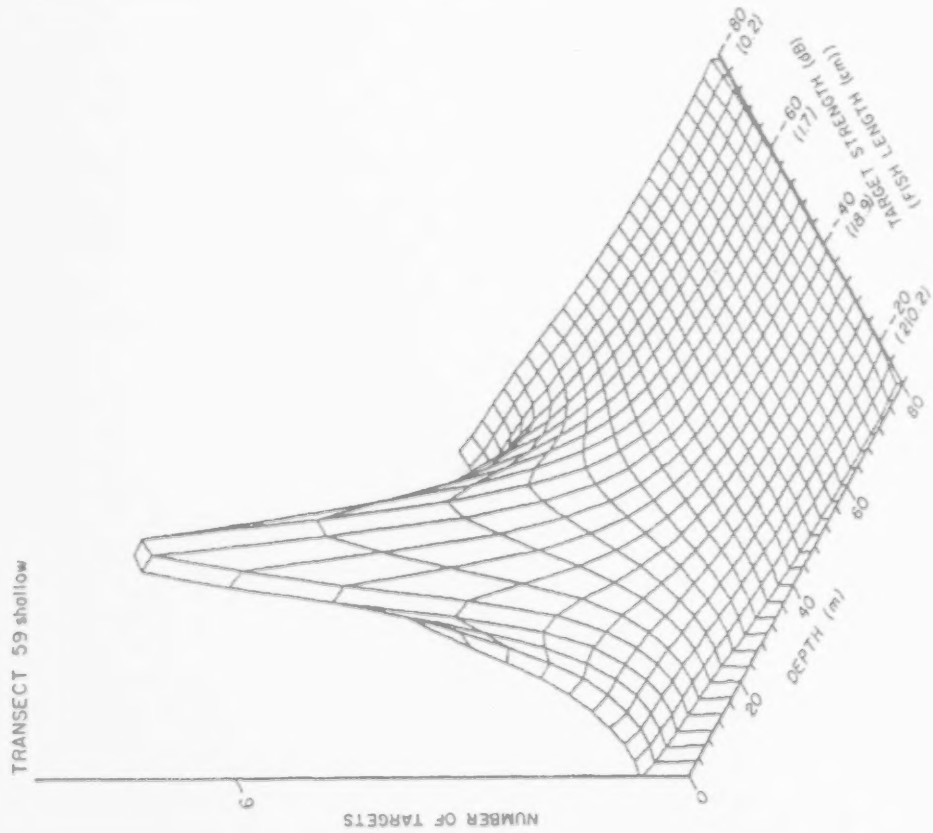

TRANSECT 54
NUMBER OF TARGETS
1
0
20
DEPTH (m)
40
60
80
-20
(-10.2)
-40
(-18.9)
-60
(-27)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

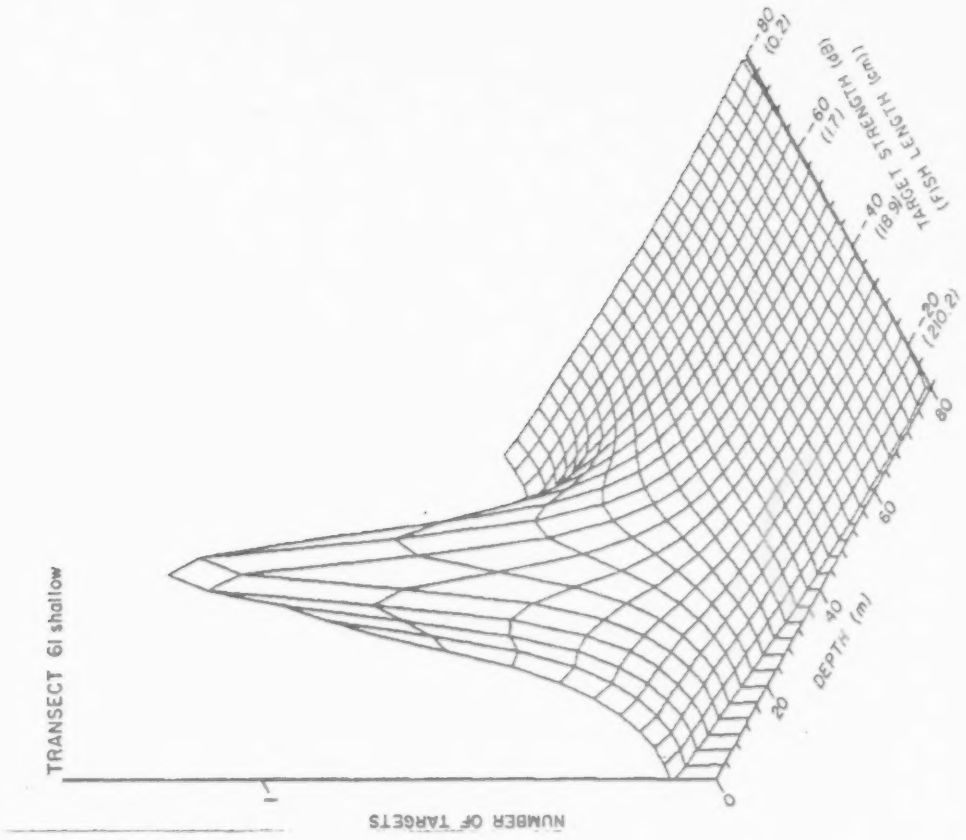

TRANSECT 55
NUMBER OF TARGETS
1
0
20
DEPTH (m)
40
60
80
-20
(-10.2)
-40
(-18.9)
-60
(-27)
-80
(0.2)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

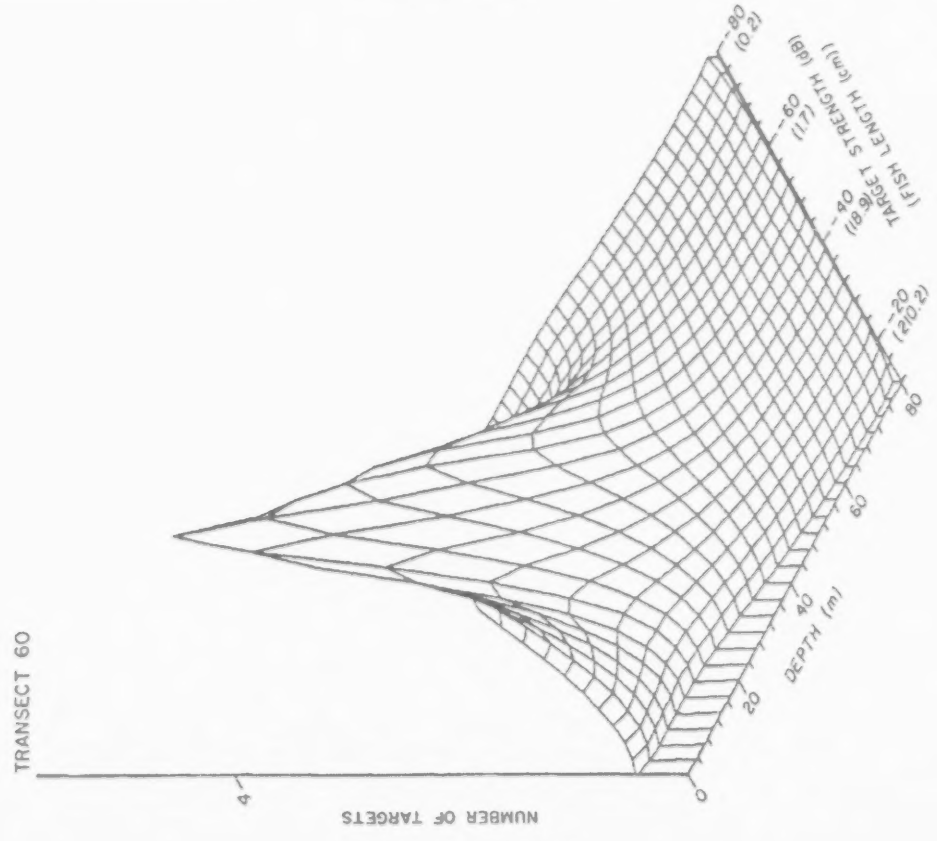

TRANSECT 58 deep
NUMBER OF TARGETS
1
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
-60 (1.1)
-40 (6.8)
-20 (20.2)
-80 (0.2)
FISH LENGTH (cm)

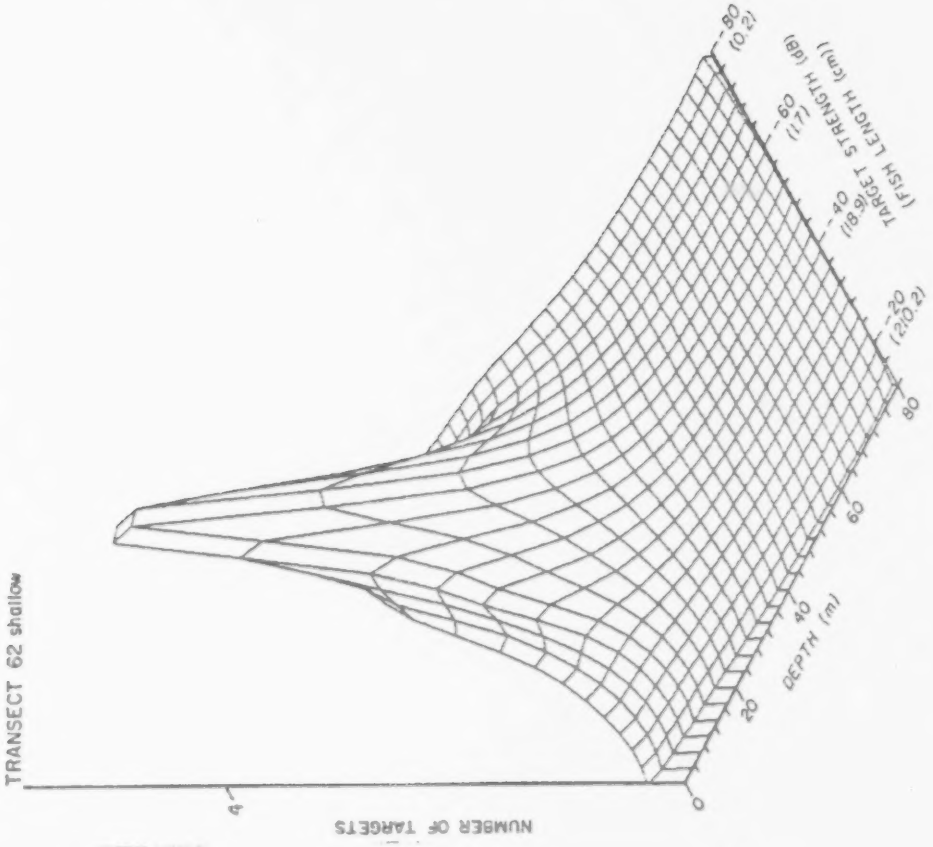

TRANSECT 57 shallow
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
-60 (1.1)
-40 (6.8)
-20 (20.2)
-80 (0.2)
FISH LENGTH (cm)

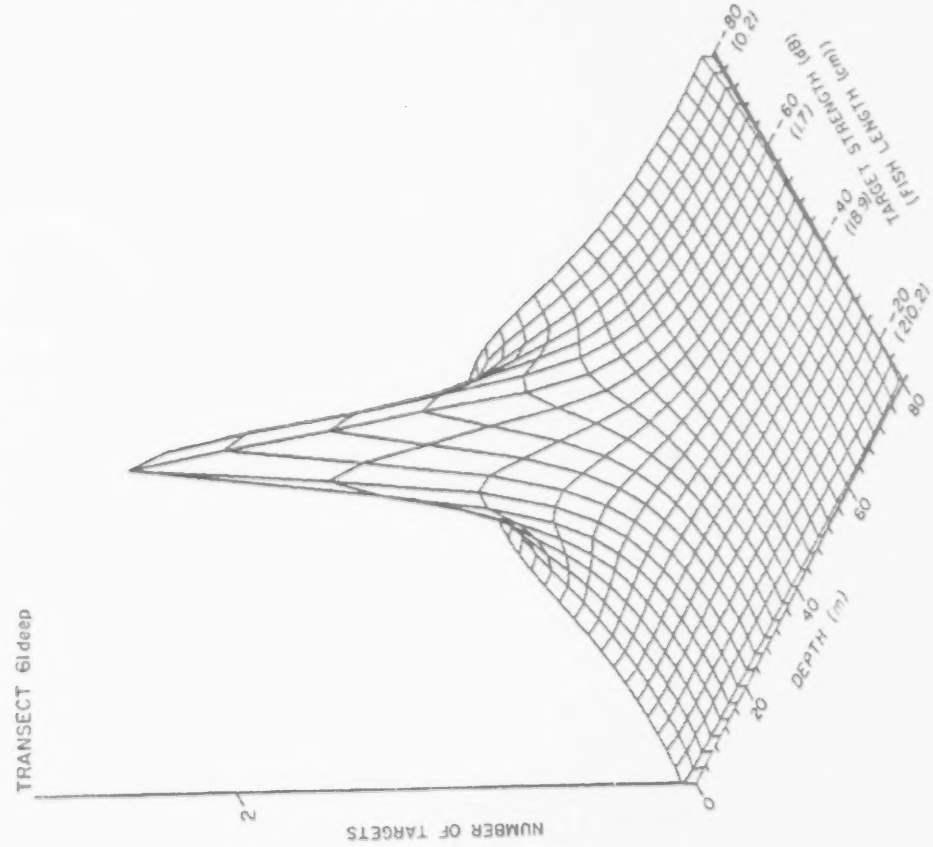

TRANSECT 59 deep
NUMBER OF TARGETS
3
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (18.6)
-60 (1.7)
-80 (0.2)
TARGET STRENGTH (dB)
FISH LENGTH (cm)

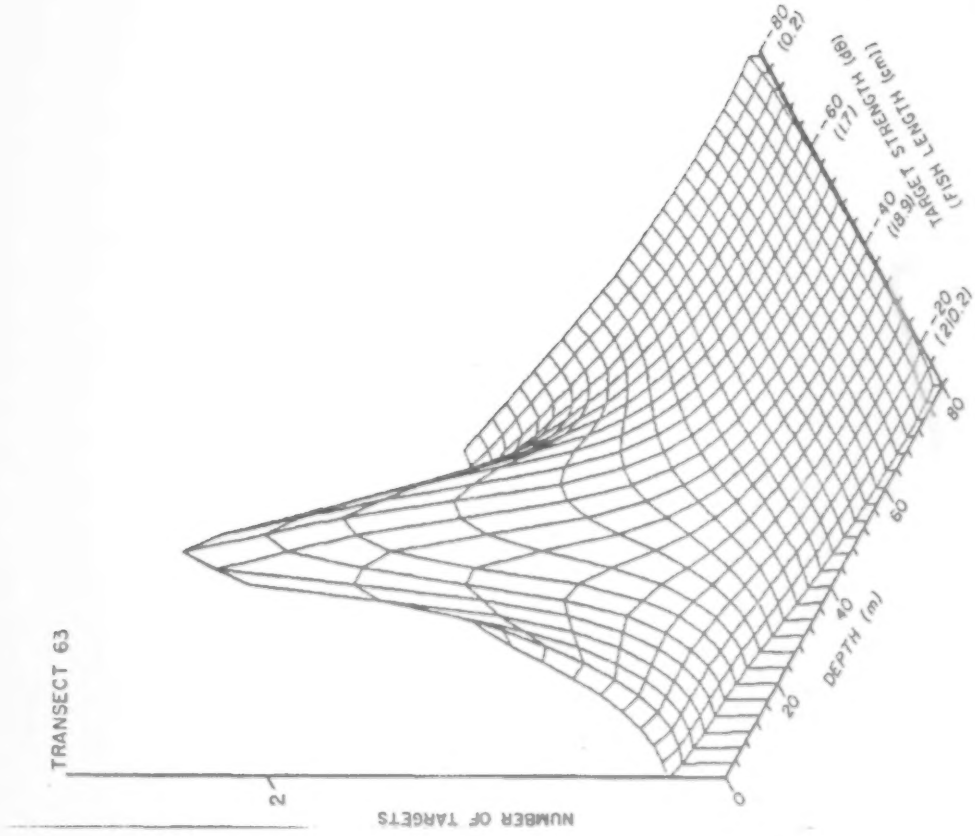

TRANSECT 59 shallow
NUMBER OF TARGETS
6
0
DEPTH (m)
20
40
60
80
-20 (210.2)
-40 (18.6)
-60 (1.7)
-80 (0.2)
TARGET STRENGTH (dB)
FISH LENGTH (cm)

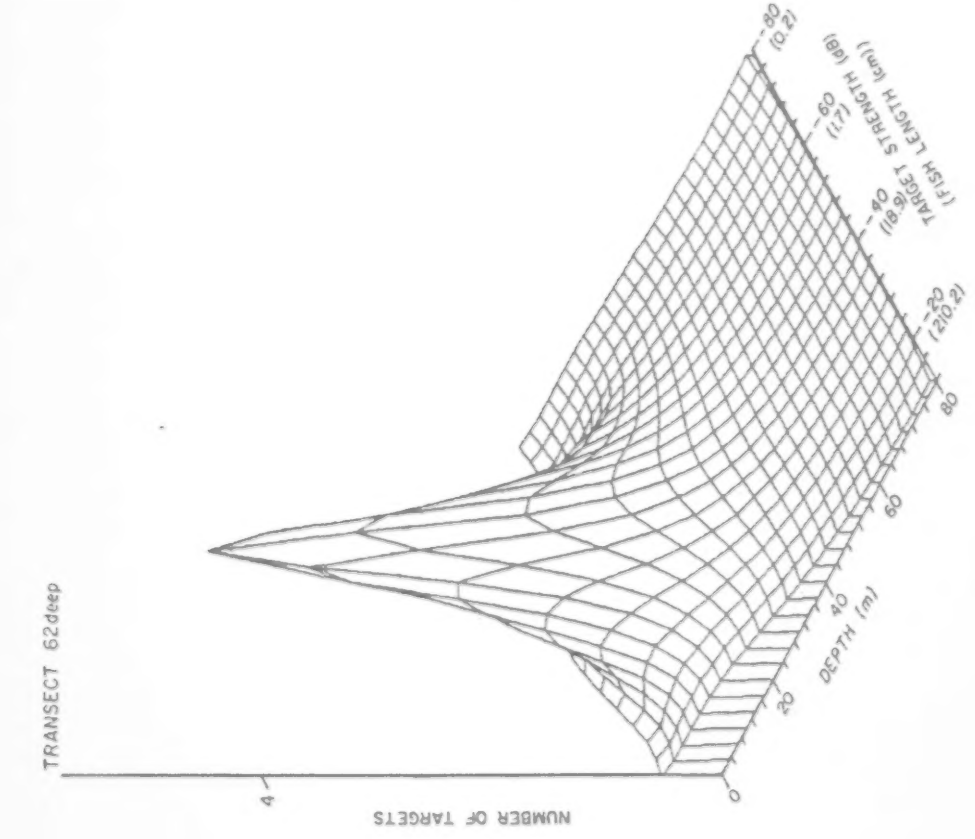

TRANSECT 61 shallow
NUMBER OF TARGETS
1
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.6)
-20 (210.2)

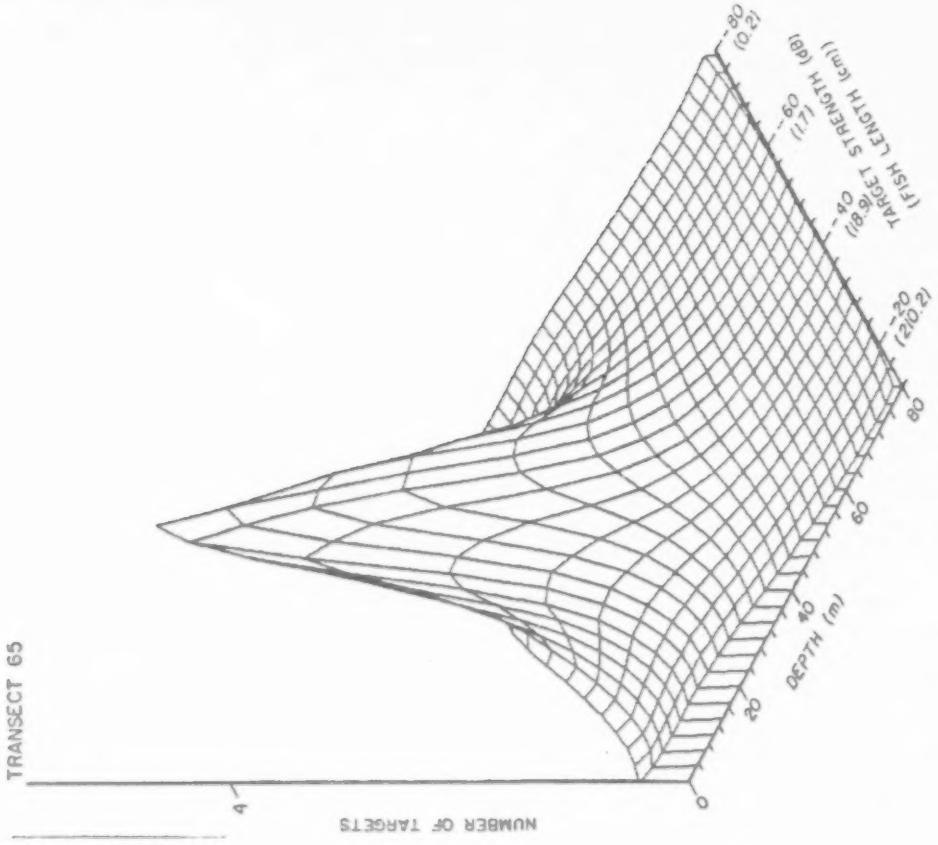

TRANSECT 60
NUMBER OF TARGETS
4
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.6)
-20 (210.2)

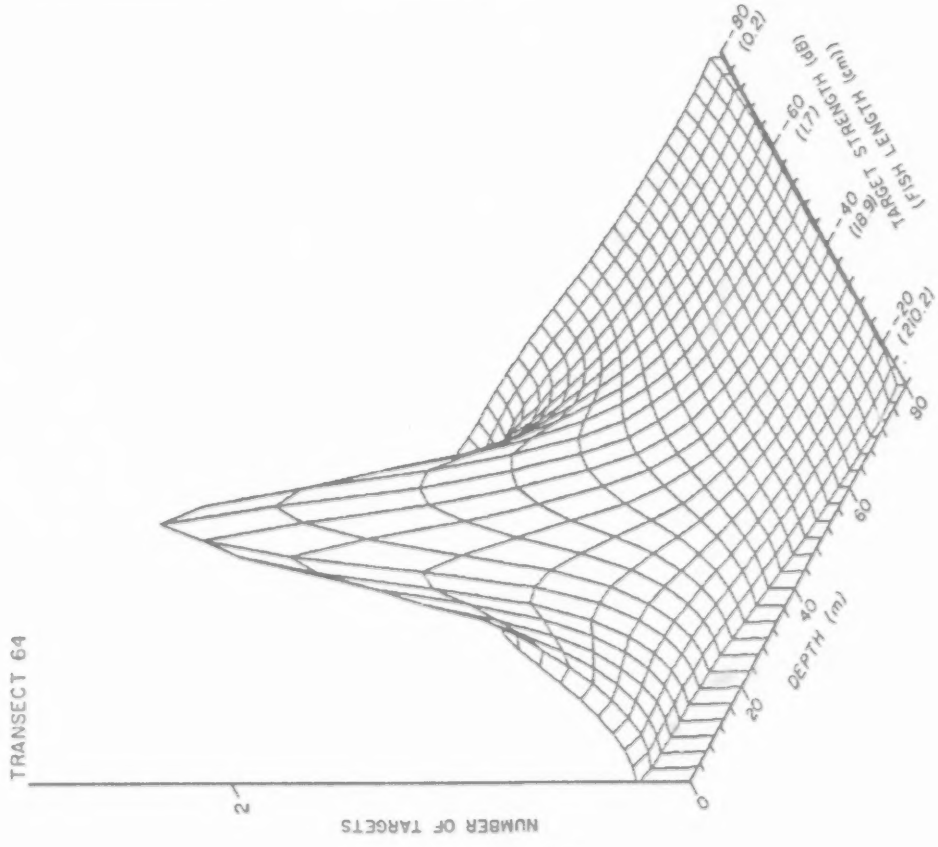

TRANSECT 62 shallow
NUMBER OF TARGETS
4
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (10.2)
-60 (1.1)
-40 (18.9)
-20 (210.2)

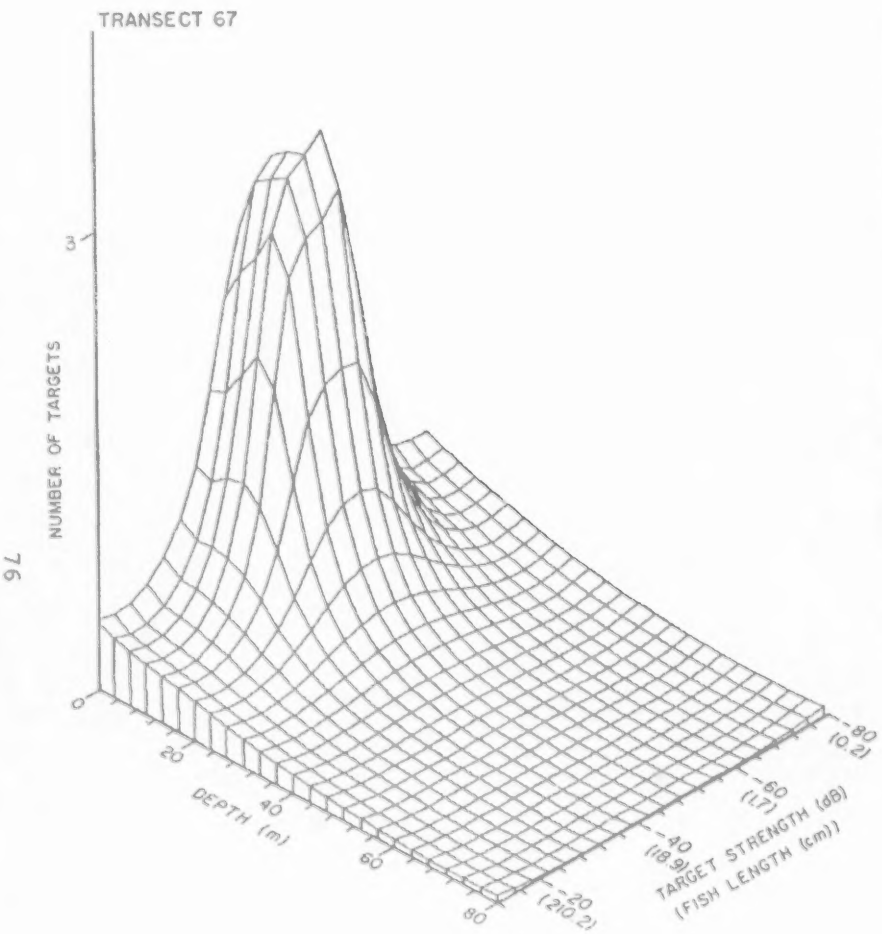

TRANSECT 61 deep
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (10.2)
-60 (1.1)
-40 (18.9)
-20 (210.2)

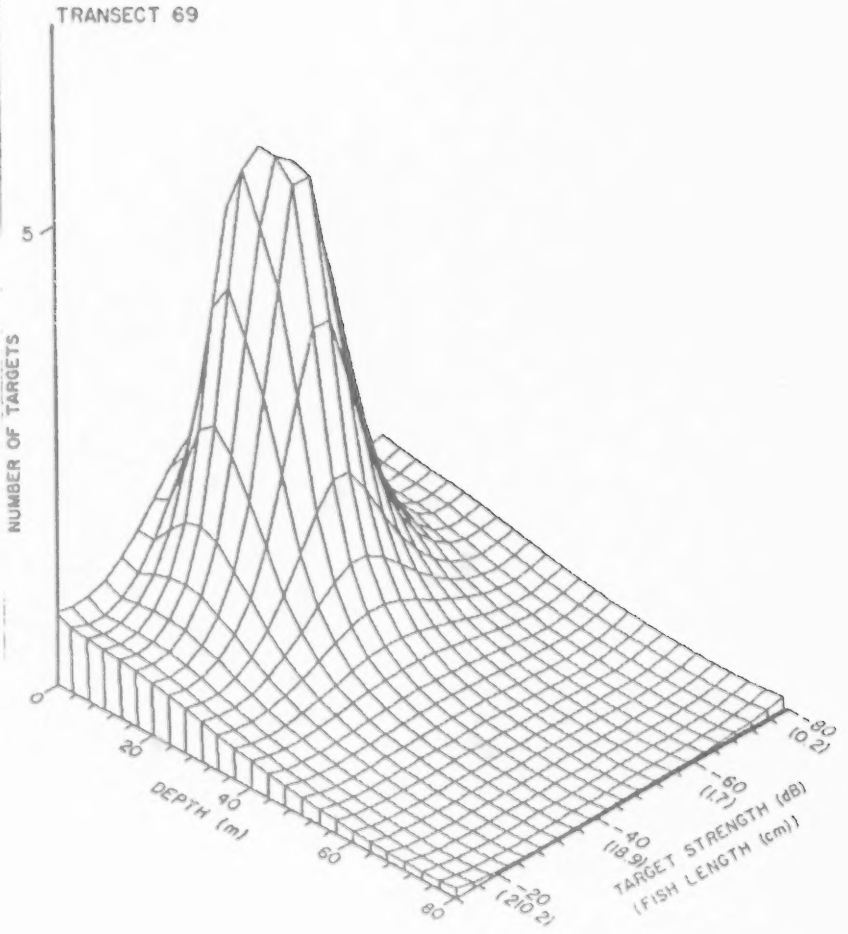

TRANSECT 63
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)


TRANSECT 62deep
NUMBER OF TARGETS
4
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)


TRANSECT 65
NUMBER OF TARGETS
4
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)

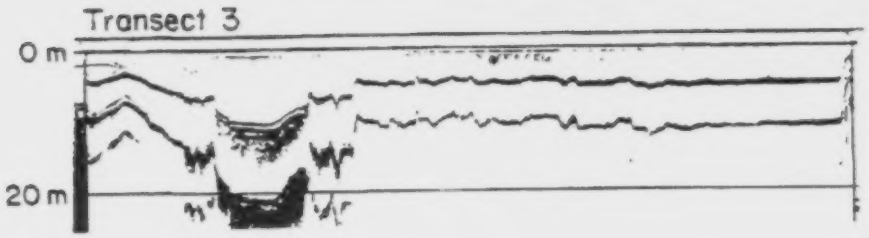

TRANSECT 64
NUMBER OF TARGETS
2
0
DEPTH (m)
20
40
60
80
TARGET STRENGTH (dB)
FISH LENGTH (cm)
-80 (0.2)
-60 (1.7)
-40 (18.9)
-20 (210.2)

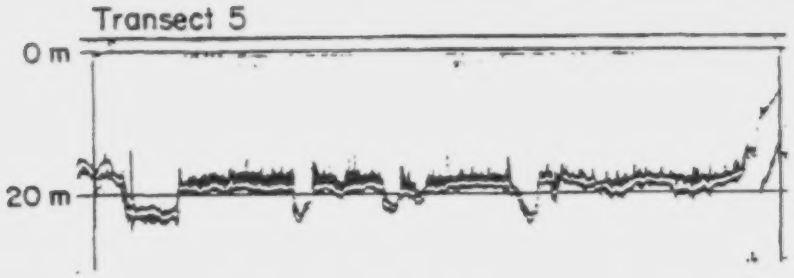

TRANSECT 67
NUMBER OF TARGETS
3
0
20
DEPTH (m)
40
60
80
-20
(-21.0 z)
-40
(-18.9)
-60
(-1.7)
-80
(10 z)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

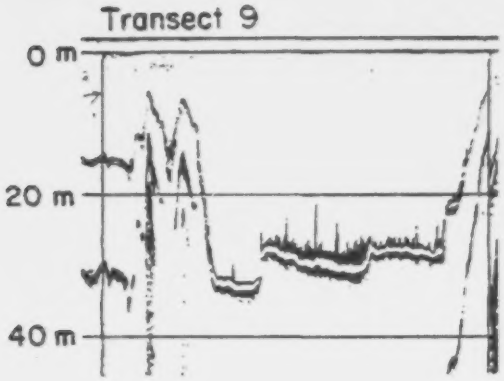

TRANSECT 69
NUMBER OF TARGETS
5
0
20
DEPTH (m)
40
60
80
-20
(-21.0 z)
-40
(-18.9)
-60
(-1.7)
-80
(10 z)
TARGET STRENGTH (dB)
(FISH LENGTH (cm))

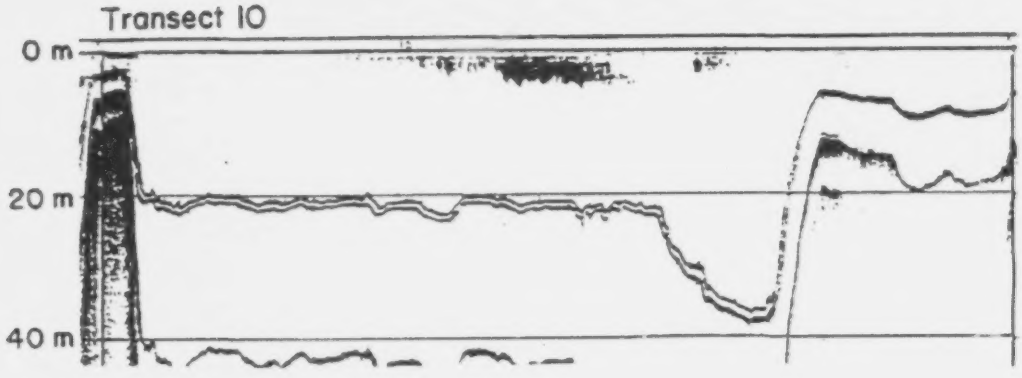
6.7 - Appendix G: Echograms

Echograms for hydroacoustic surveys of Williston Lake, 1988.

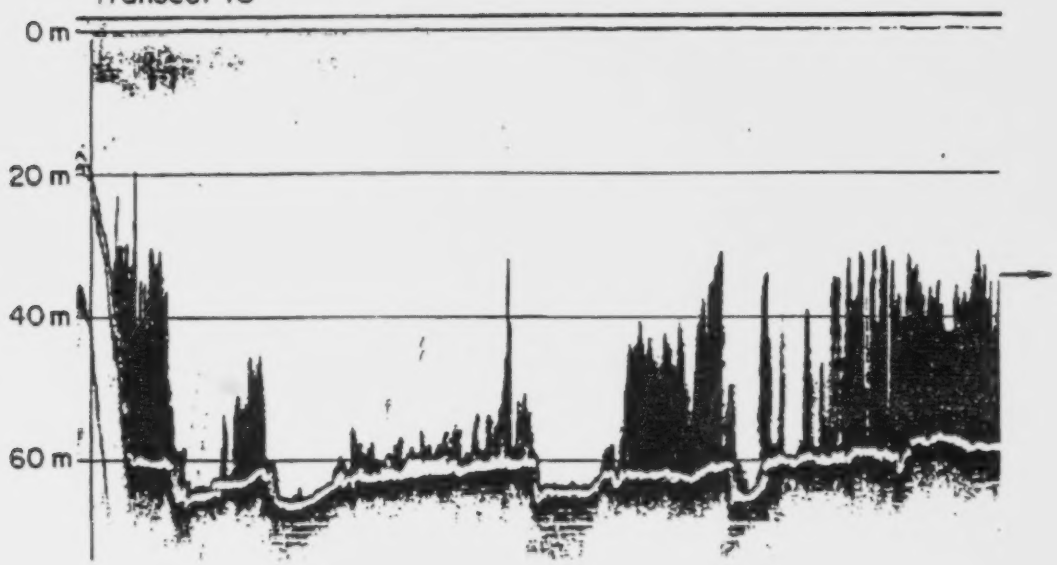

Transect 3
0 m
20 m


Transect 5
0 m
20 m

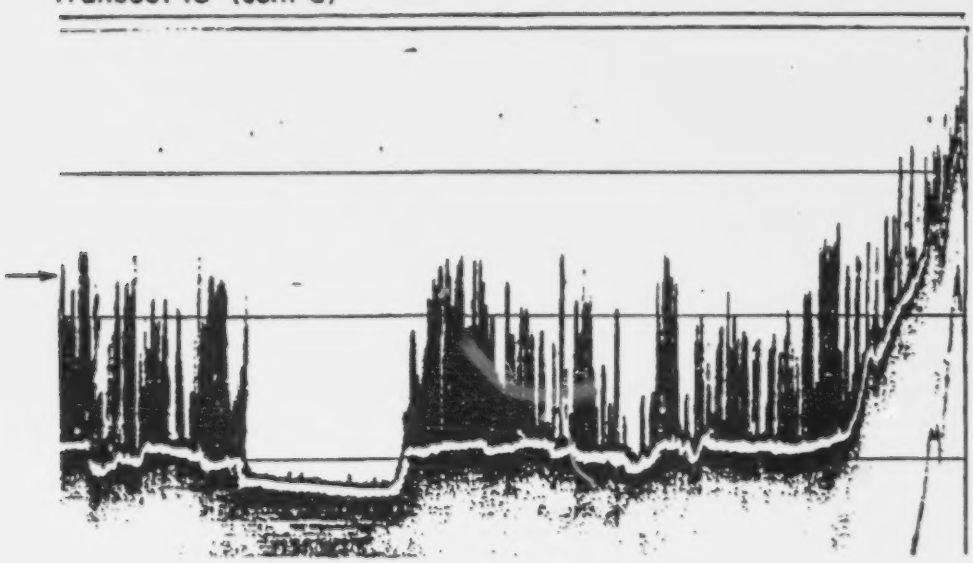

Transect 9
0 m
20 m
40 m


Transect 10
0 m
20 m
40 m

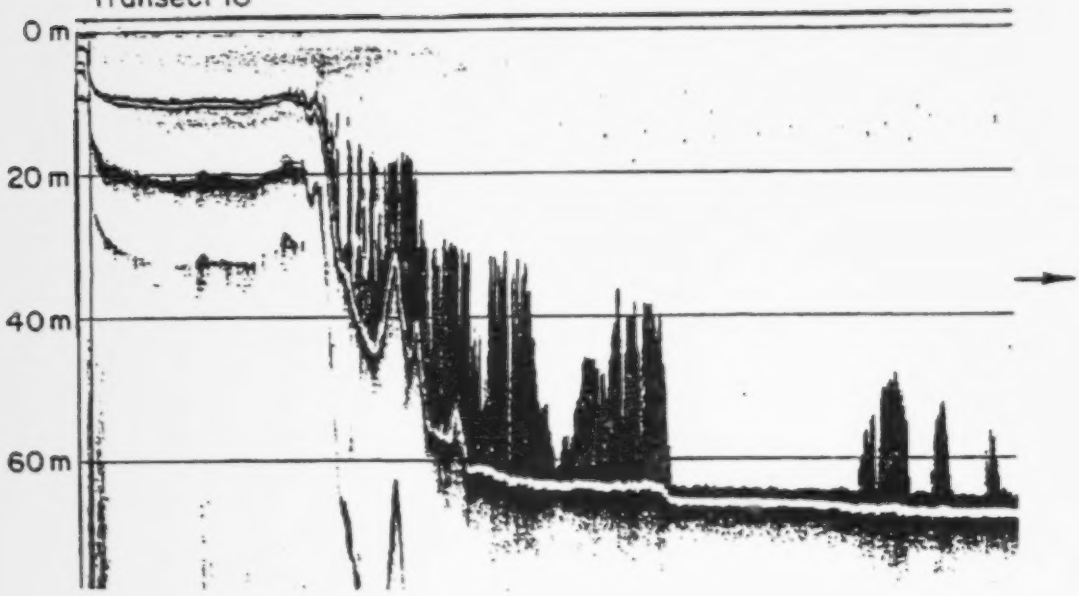
Transect 16



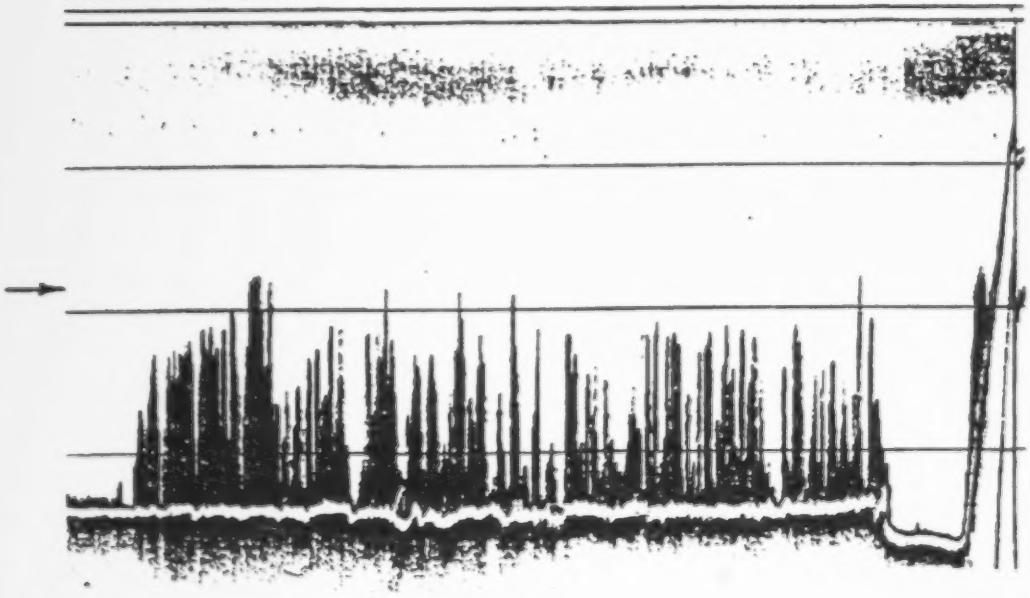
Transect 16 (cont'd)

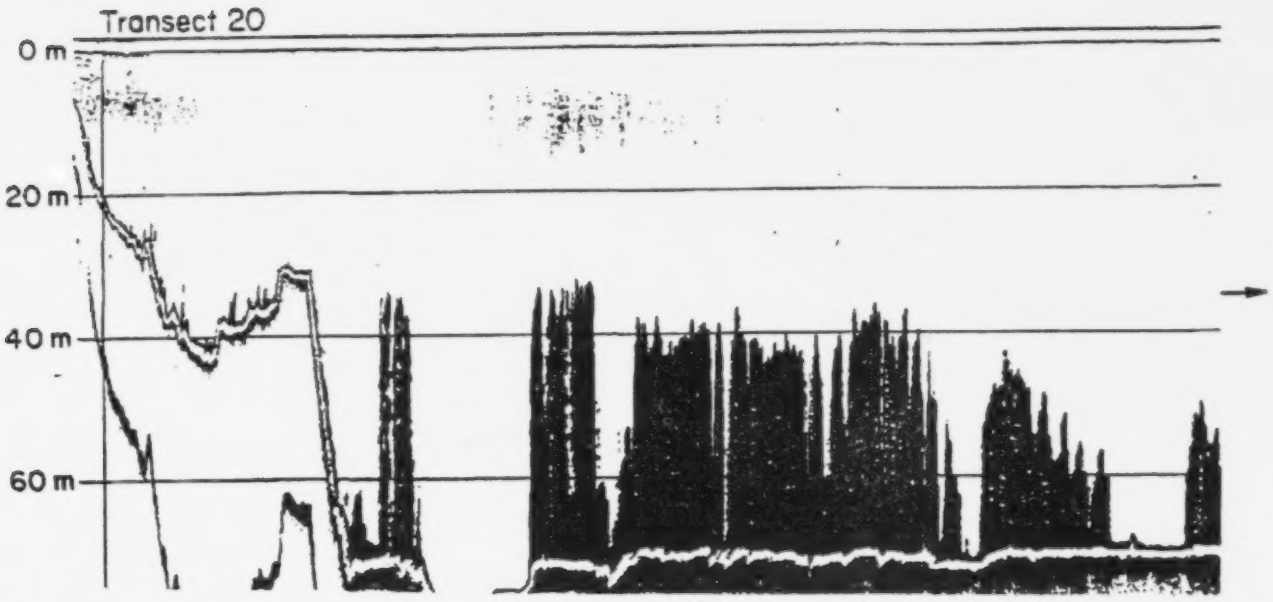


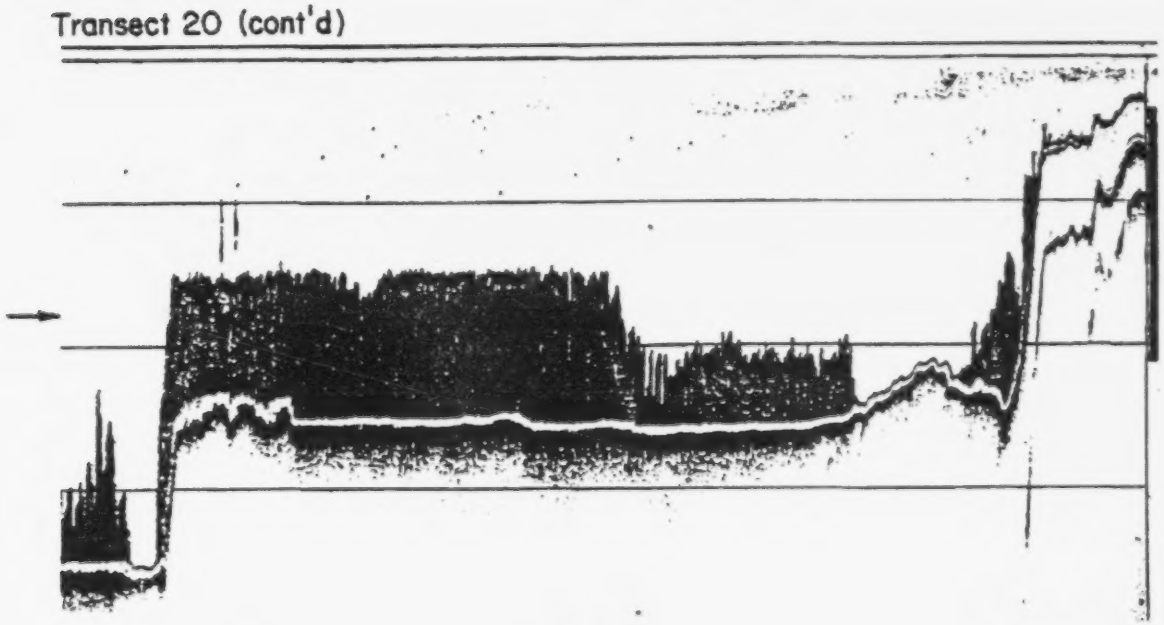
Transect 18



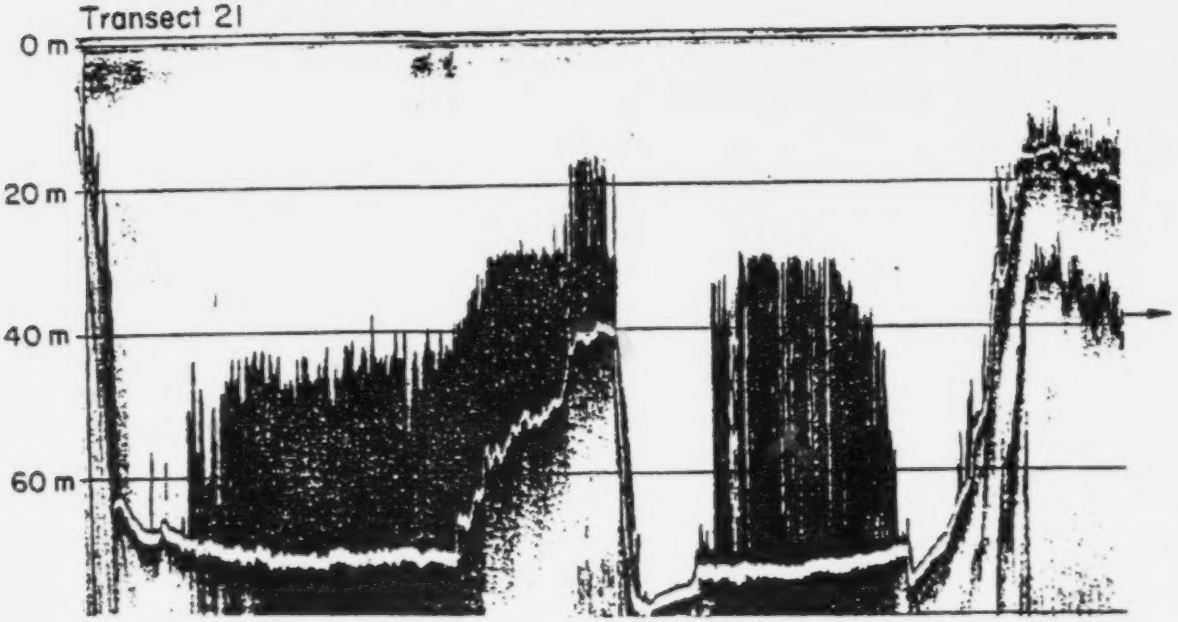
Transect 18 (cont'd)



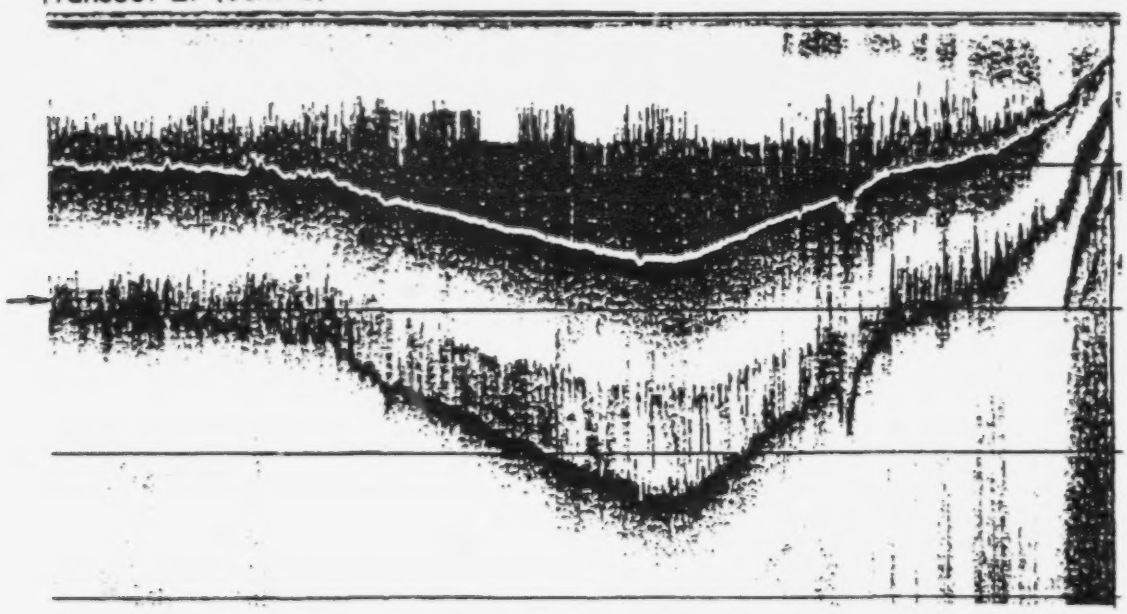

Transect 20
0 m
20 m
40 m
60 m


Transect 20 (cont'd)

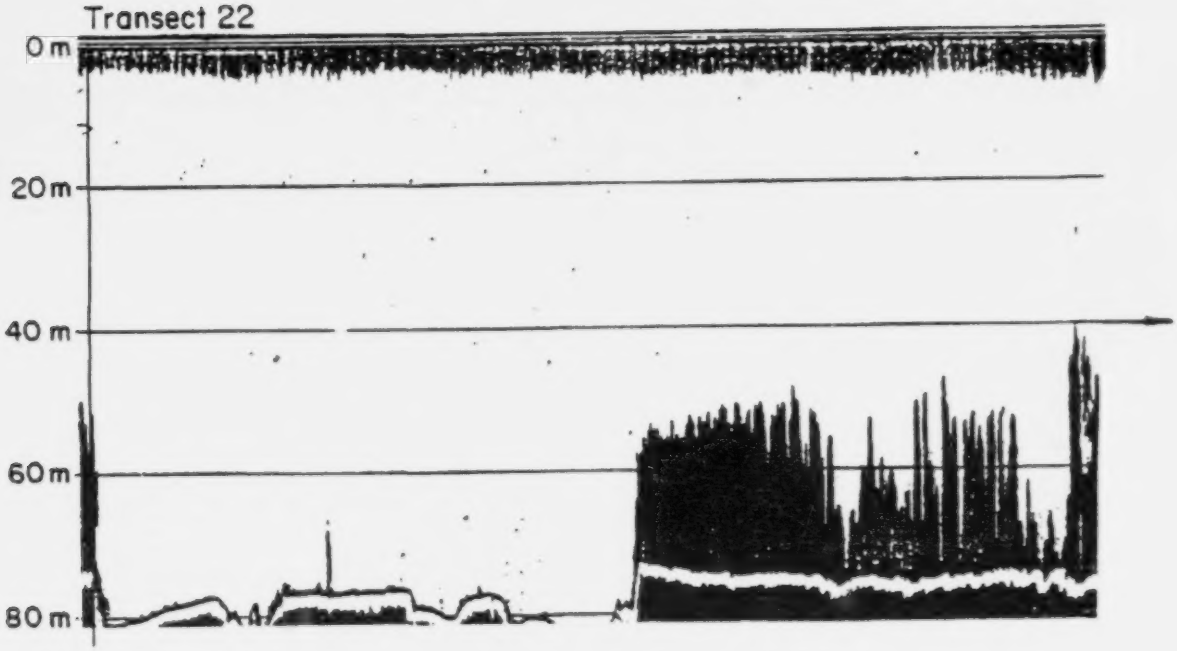
Transect 21



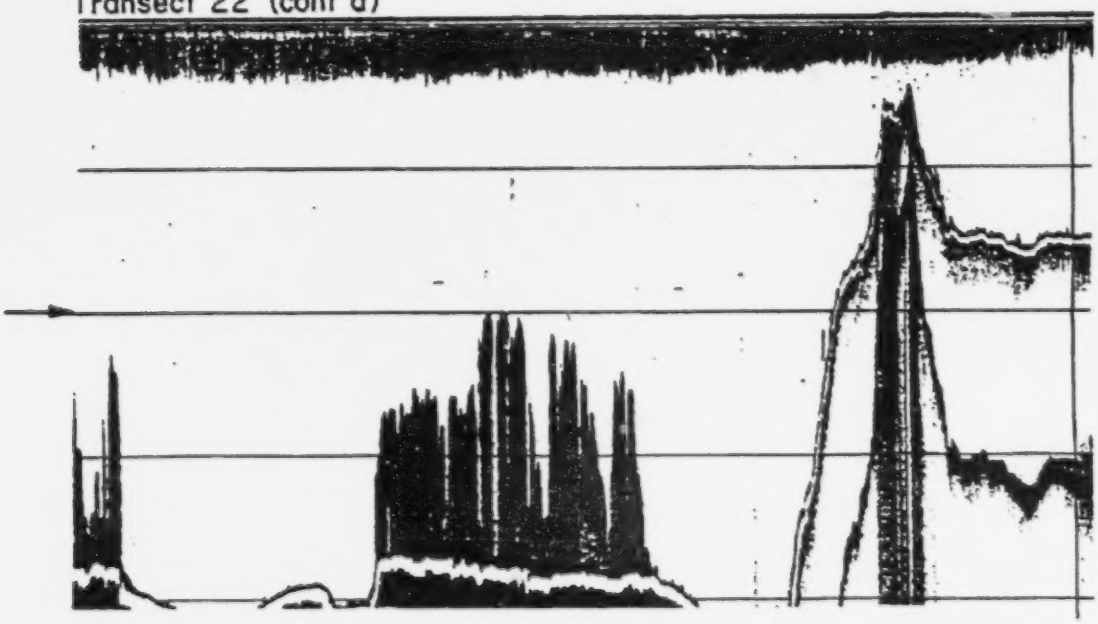
Transect 21 (cont'd)

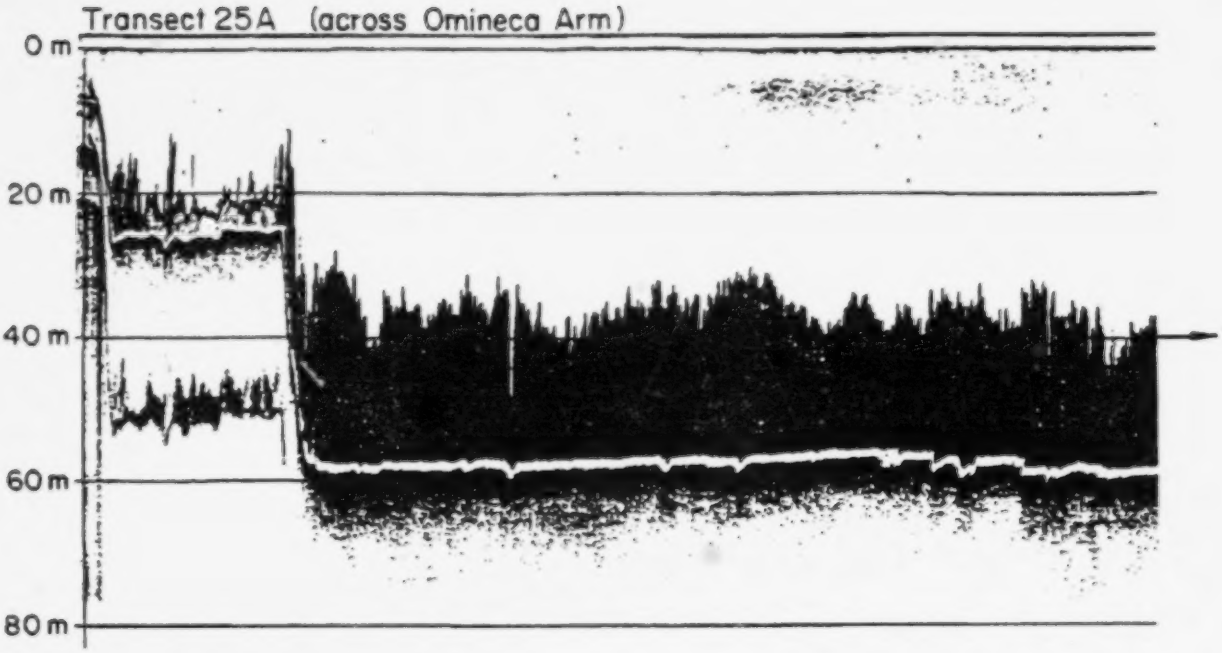


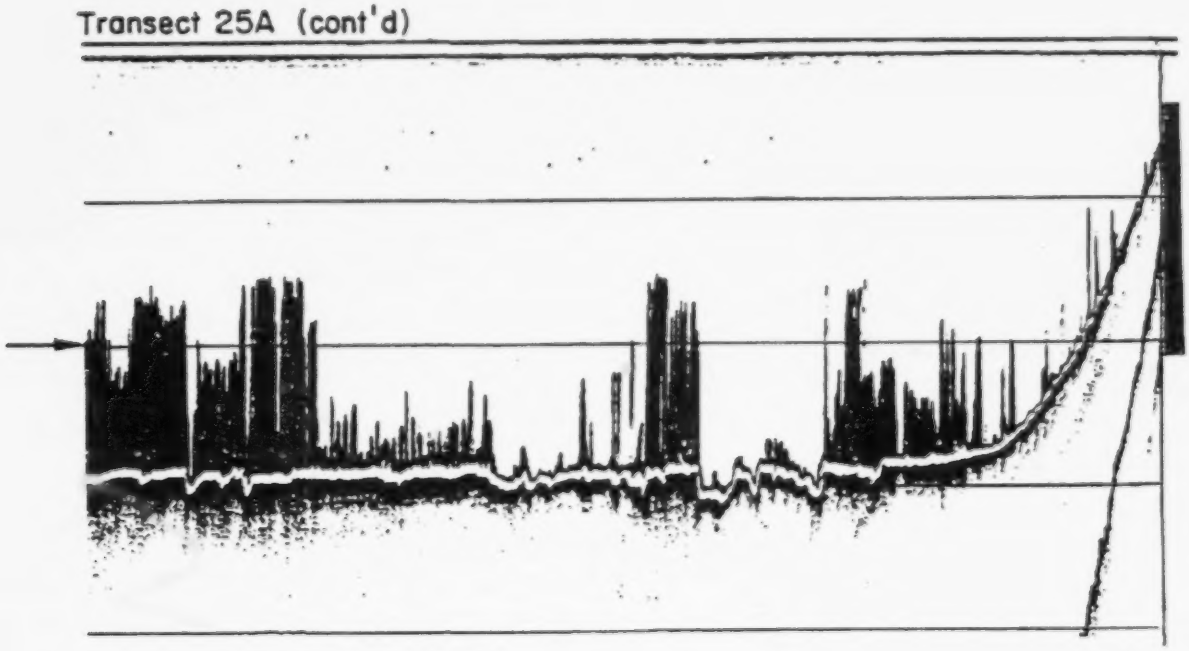
Transect 22

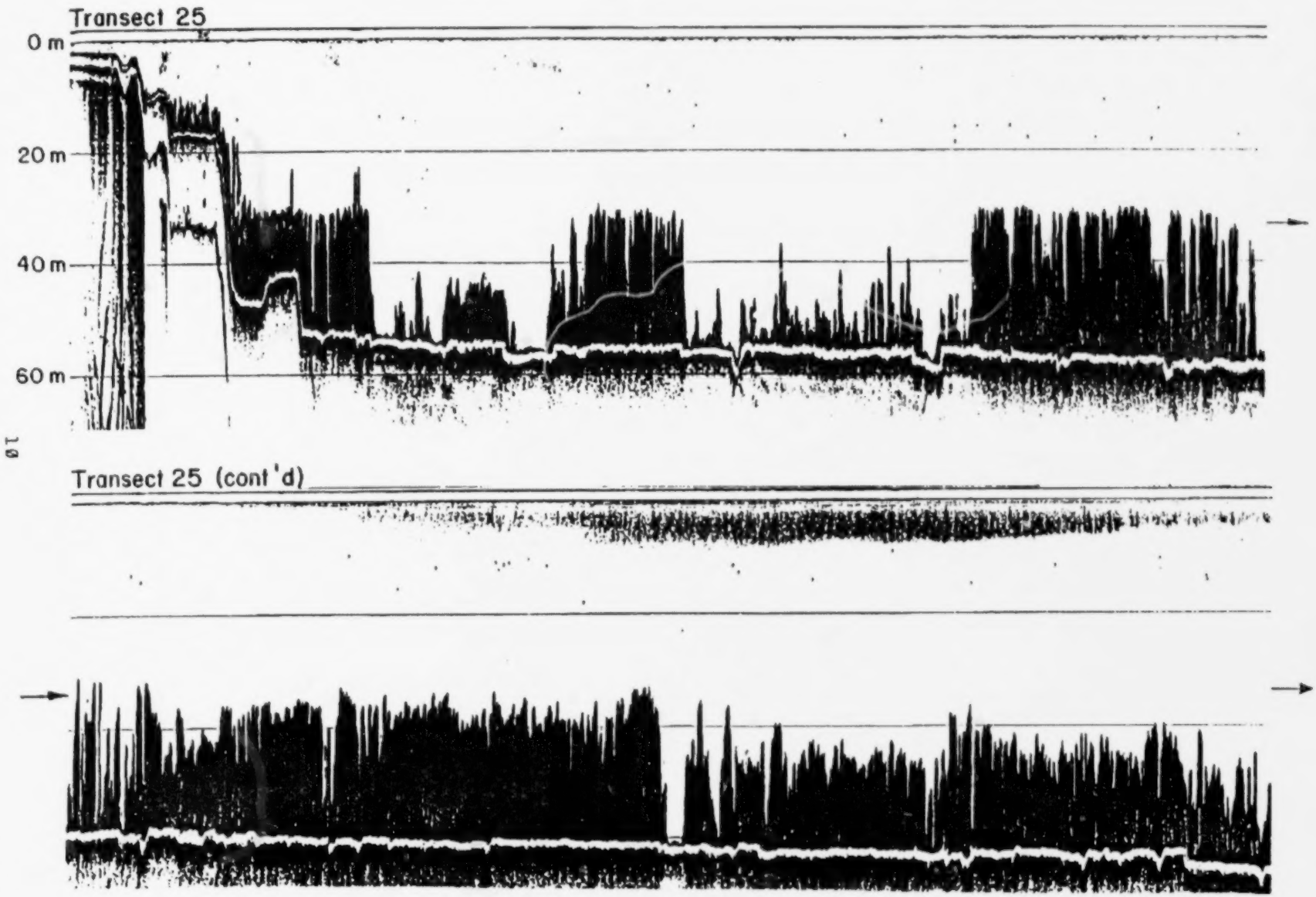


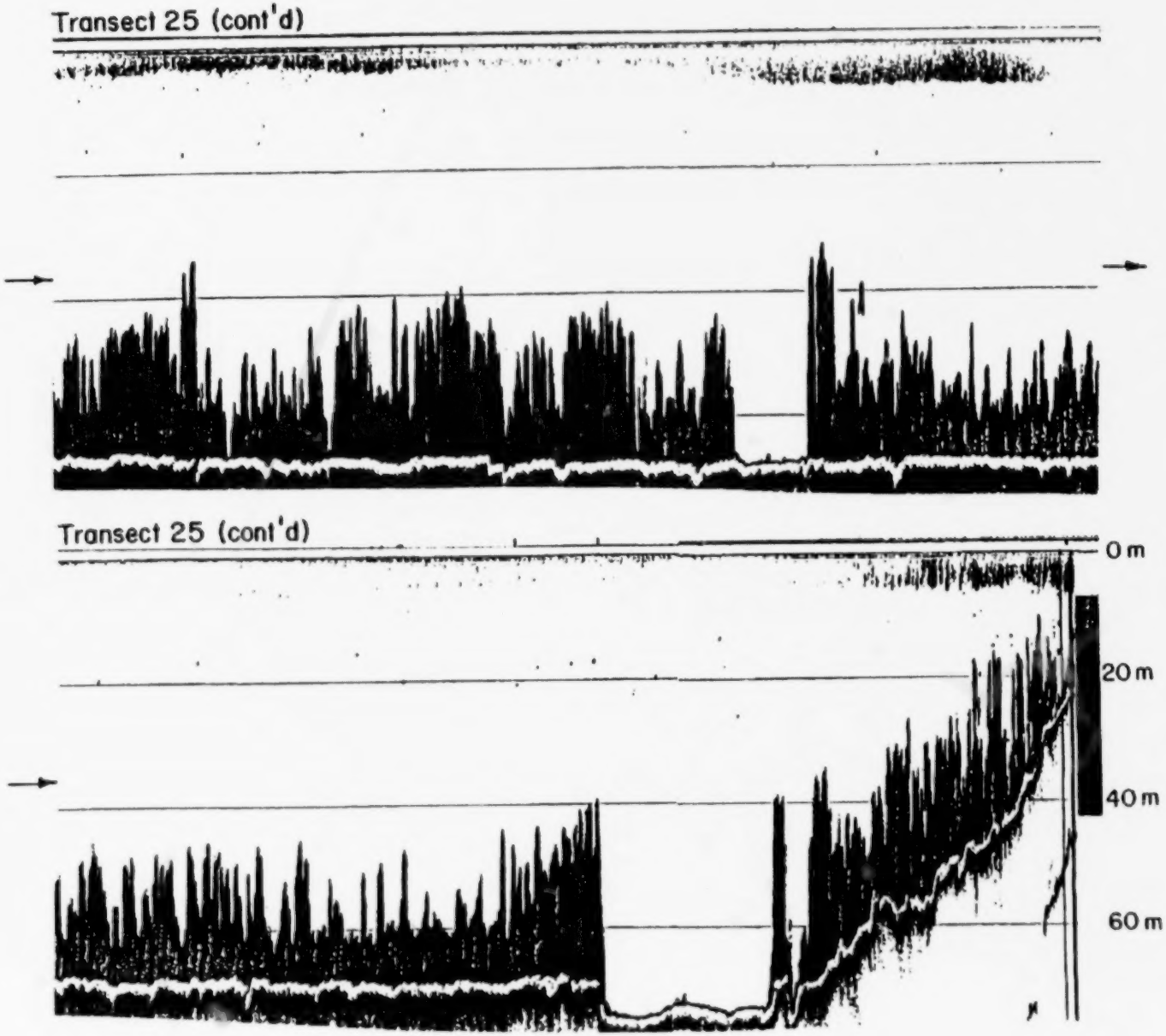
Transect 22 (cont'd)

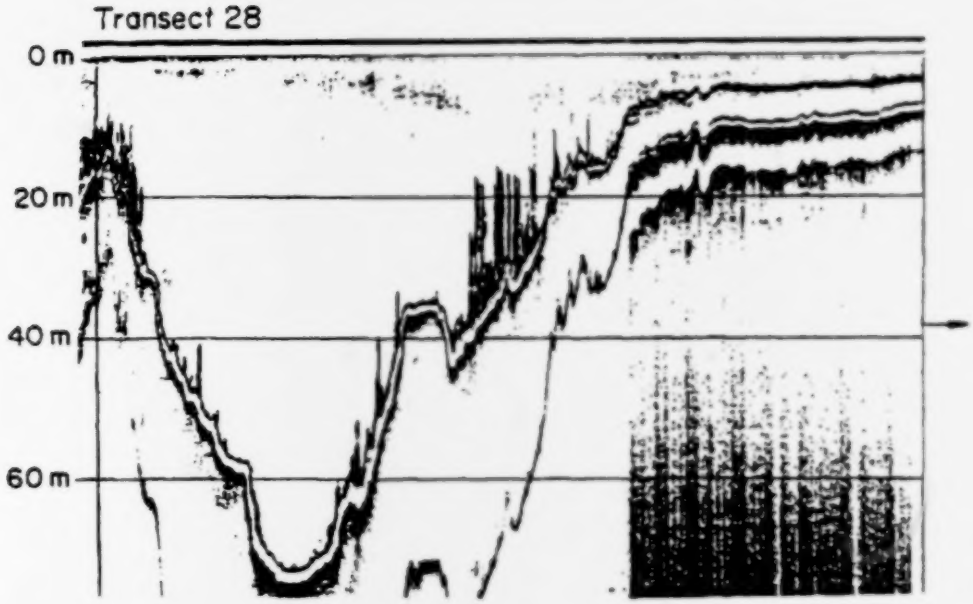


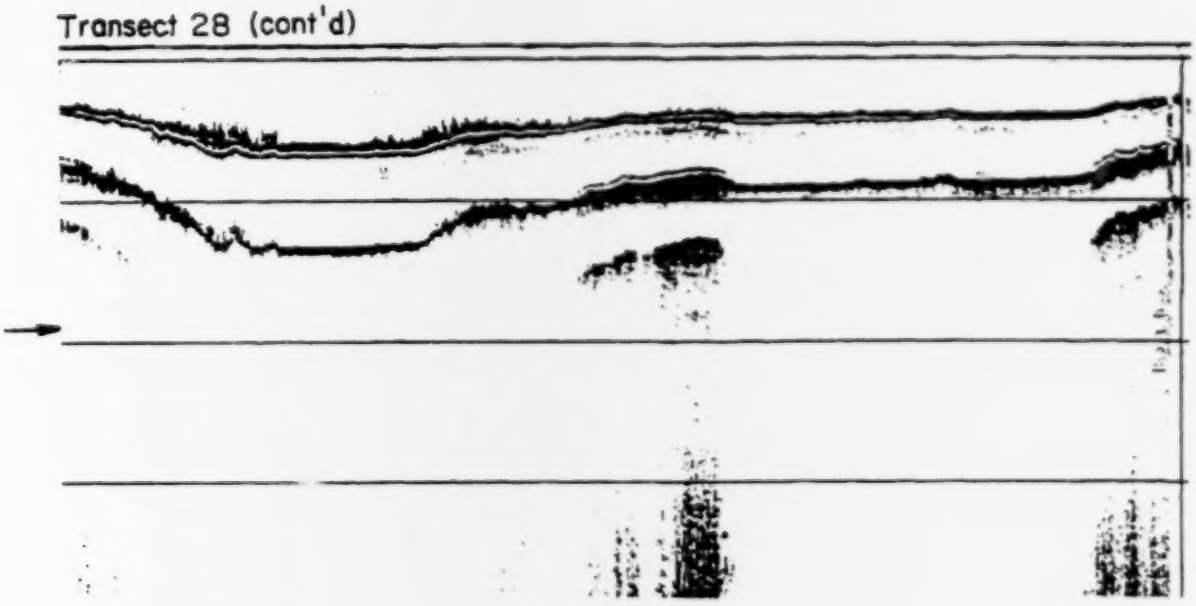

Transect 25A (across Omineca Arm)
0 m
20 m
40 m
60 m
80 m

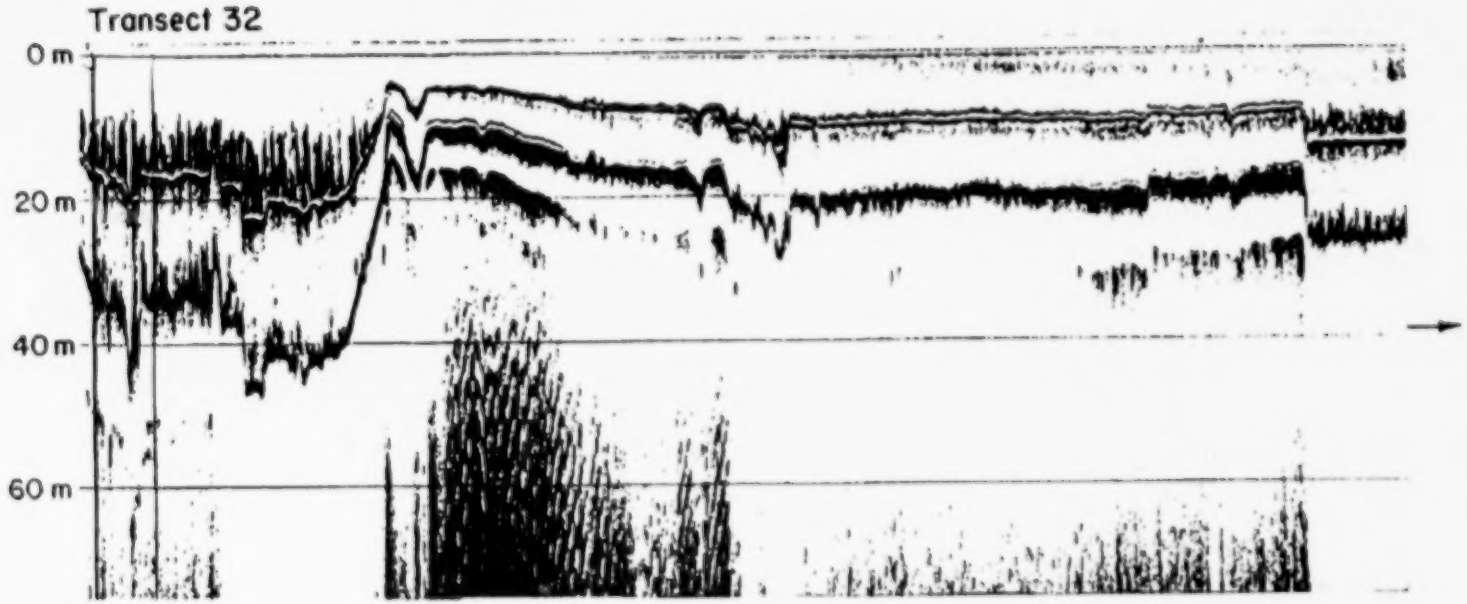

Transect 25A (cont'd)

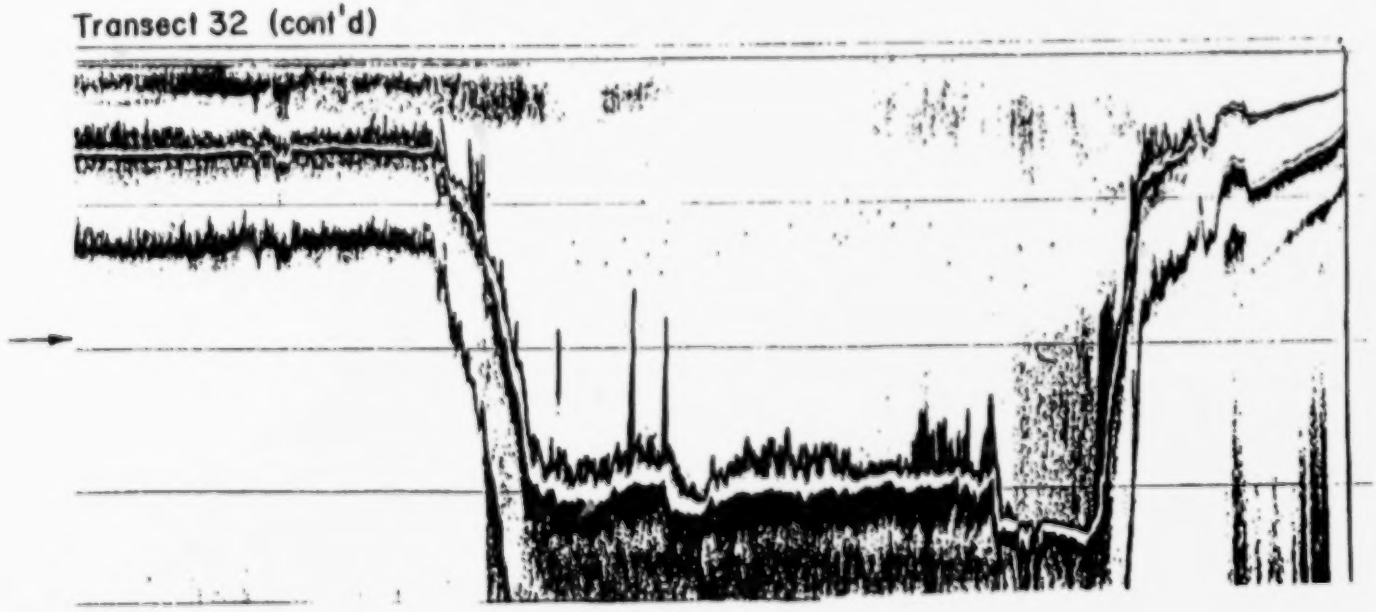

Transect 25
0 m
20 m
40 m
60 m
Transect 25 (cont'd)

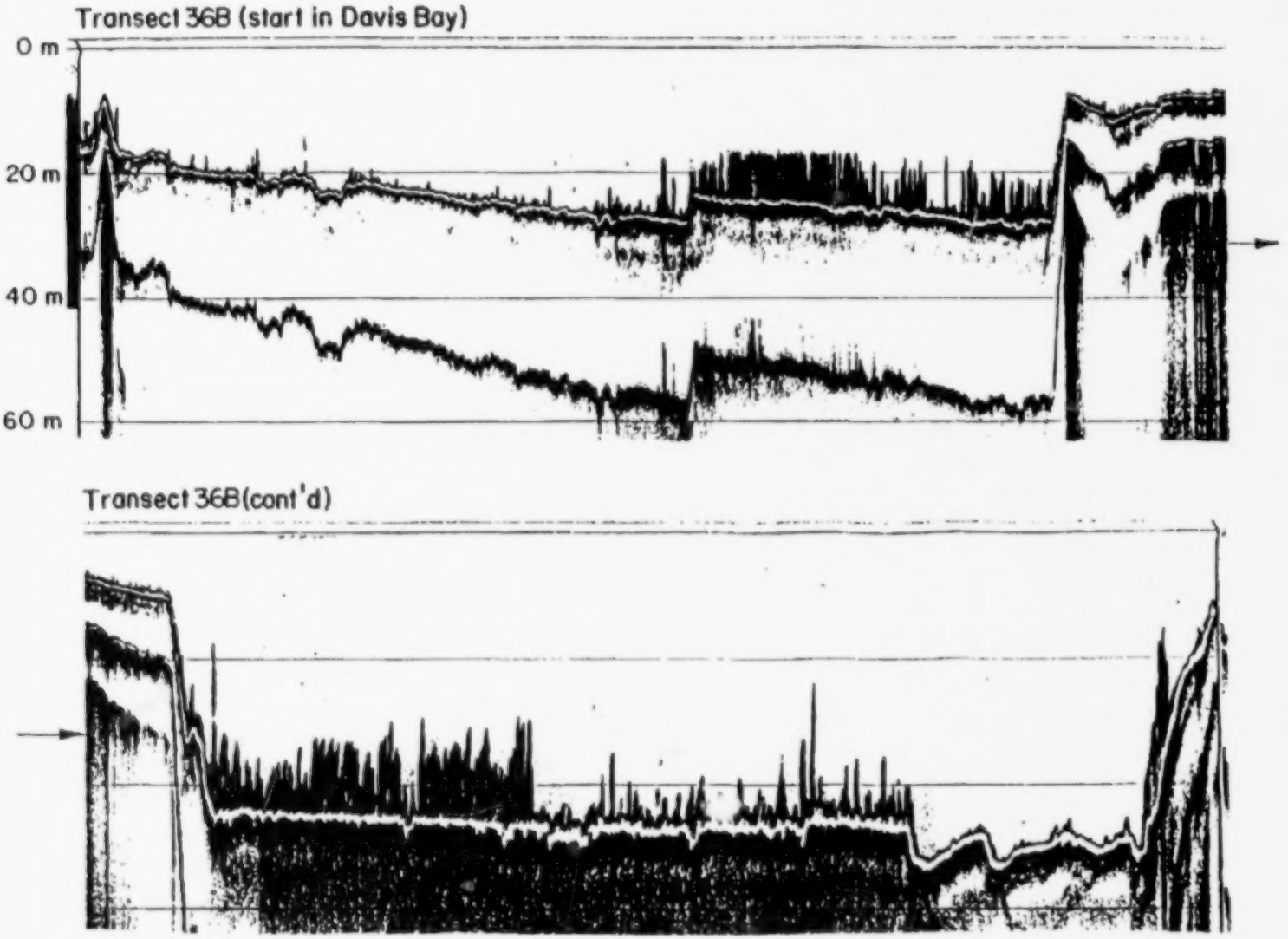

Transect 25 (cont'd)
Transect 25 (cont'd)
0 m
20 m
40 m
60 m

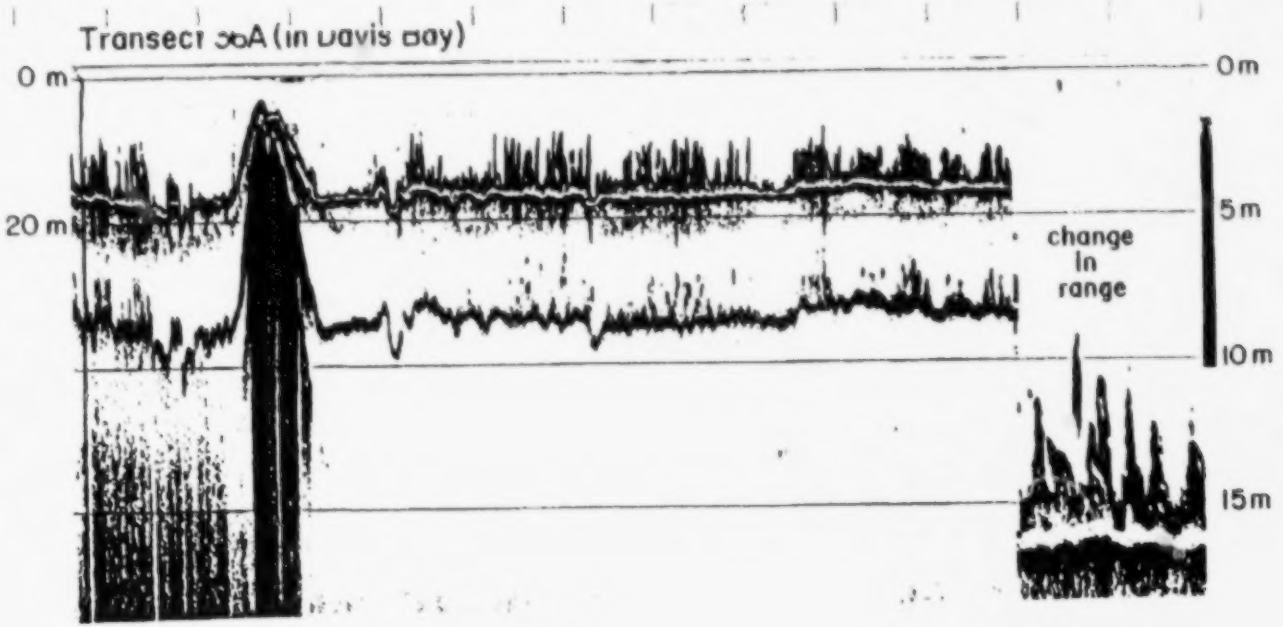

Transect 28
0 m
20 m
40 m
60 m

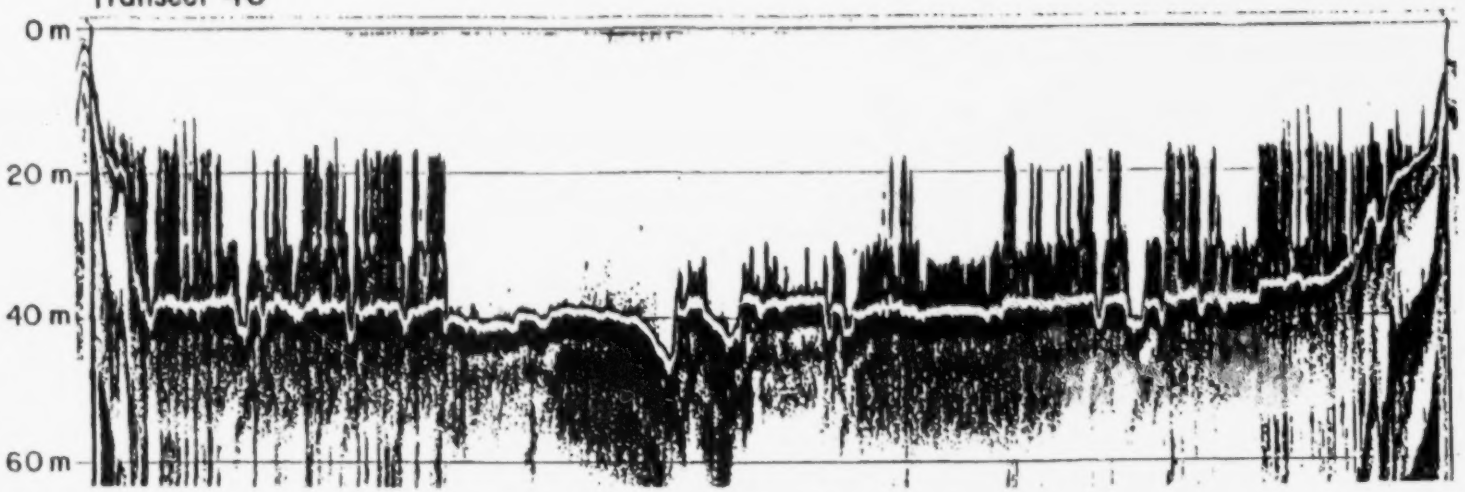

Transect 28 (cont'd)


Transect 32
0 m
20 m
40 m
60 m

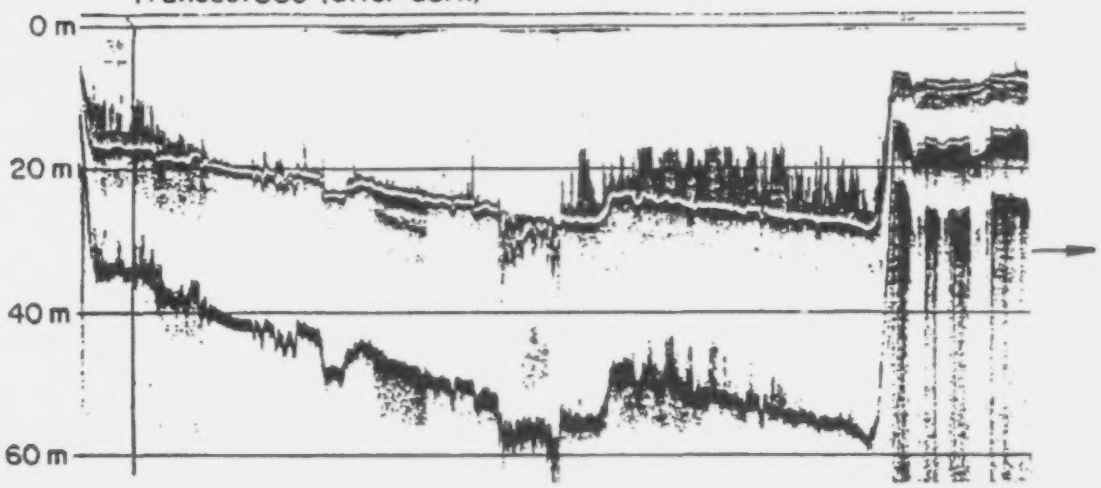

Transect 32 (cont'd)


Transect 36B (start in Davis Bay)
0 m
20 m
40 m
60 m
Transect 36B(cont'd)

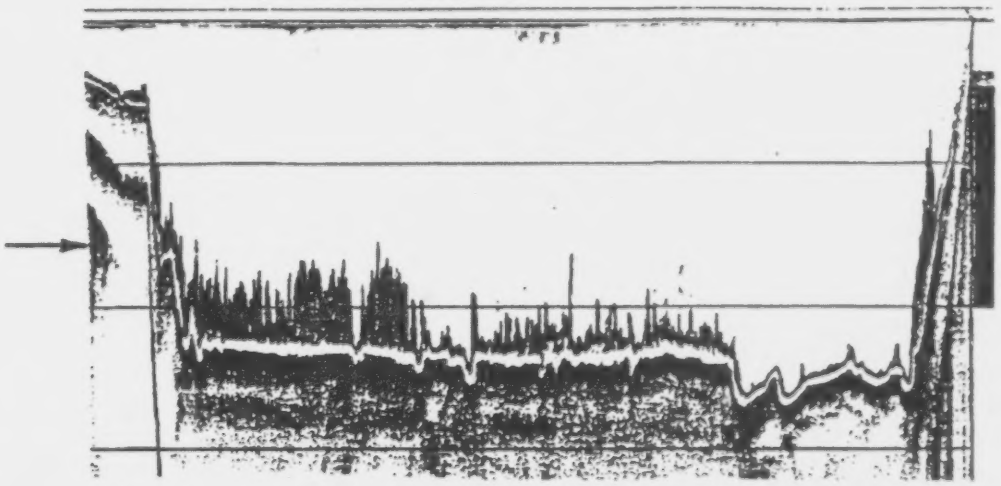

Transect 36A (in Davis Bay)
0 m
20 m
0m
change
in
range
5m
10m
15m

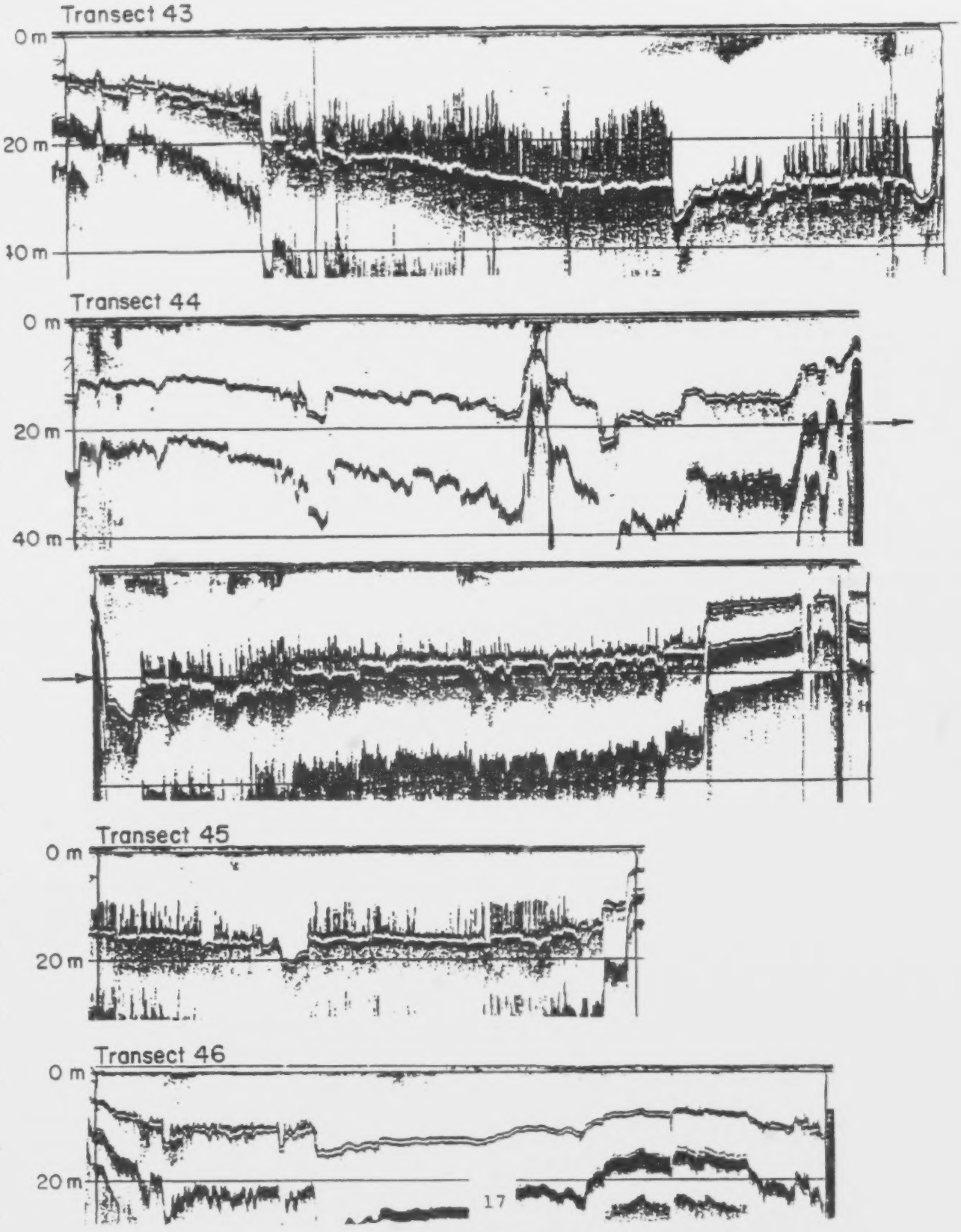

Transect 40
0 m
20 m
40 m
60 m

Transect 36C (after dark)

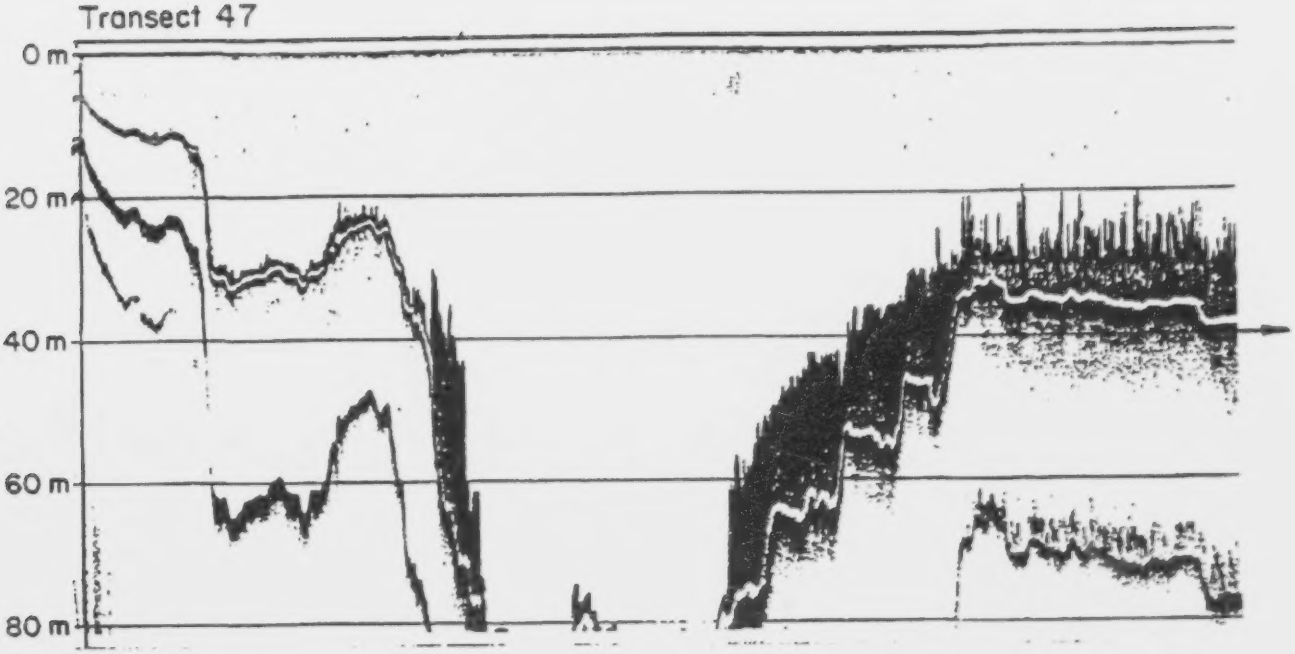


Transect 36C (after dark) (cont'd)

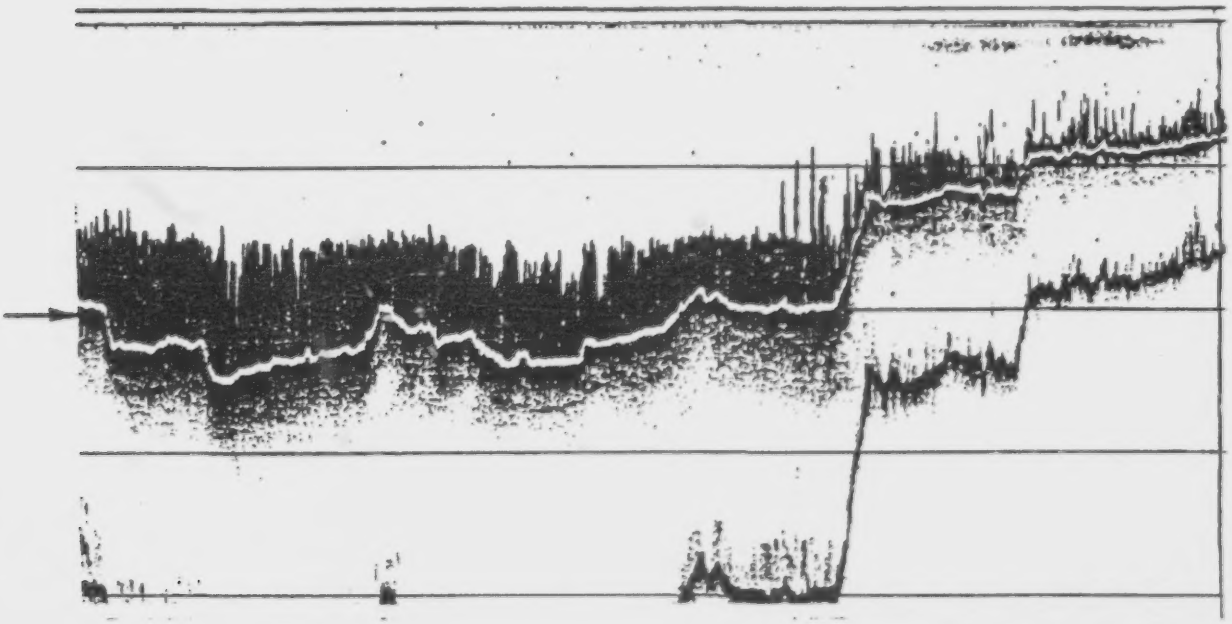


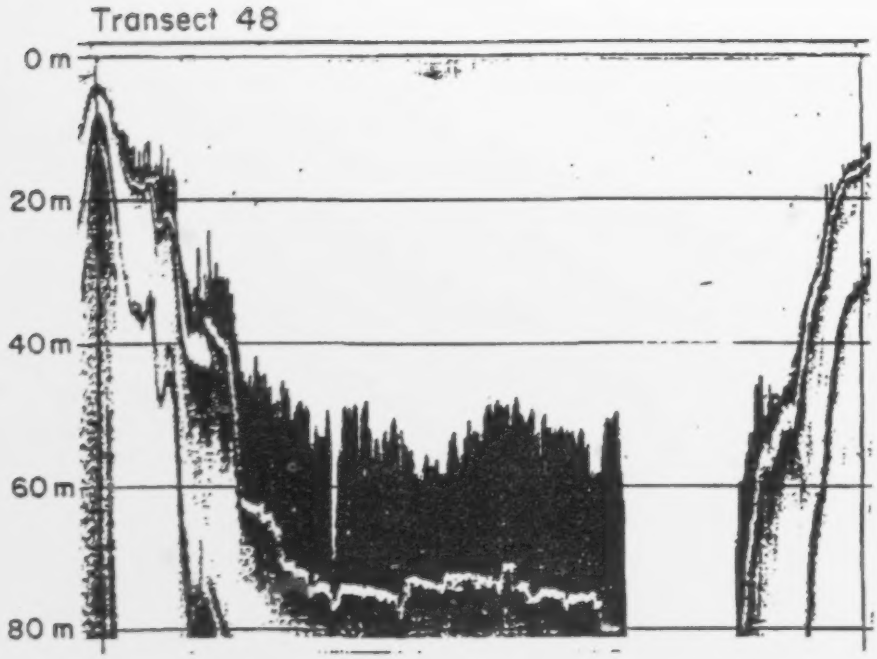

Transect 43
0 m
20 m
40 m
Transect 44
0 m
20 m
40 m
Transect 45
0 m
20 m
Transect 46
0 m
20 m

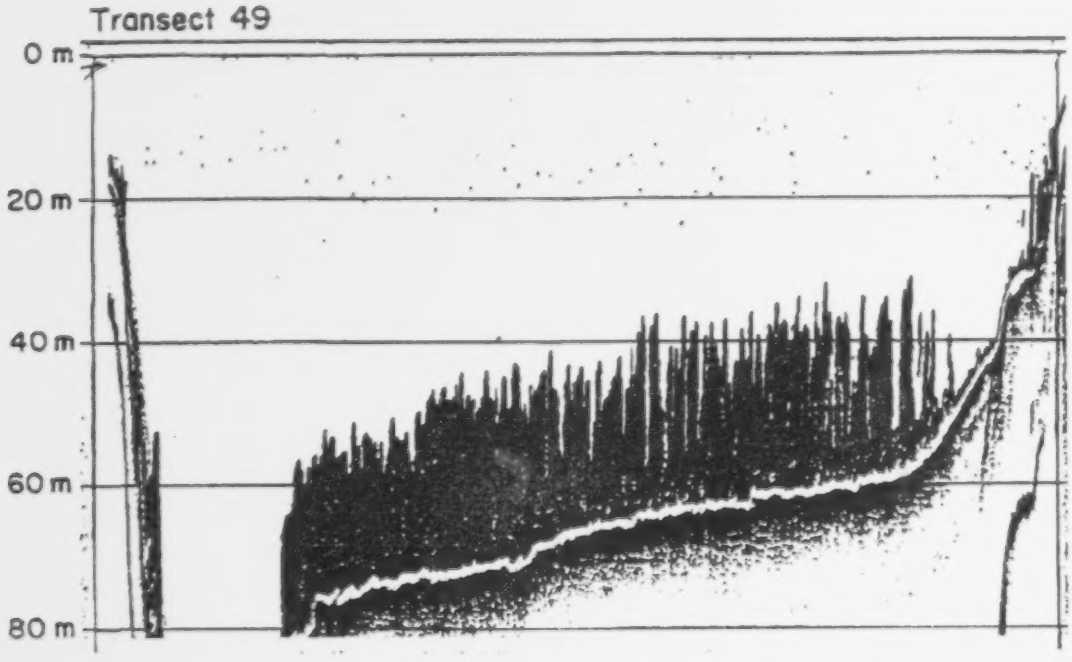
Transect 47

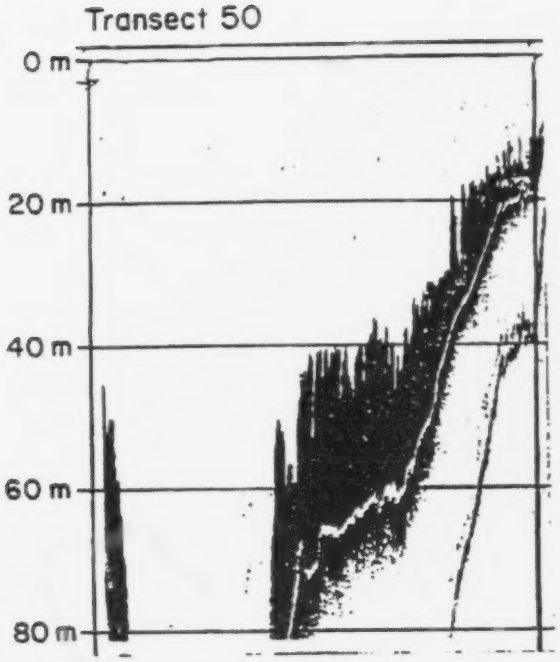


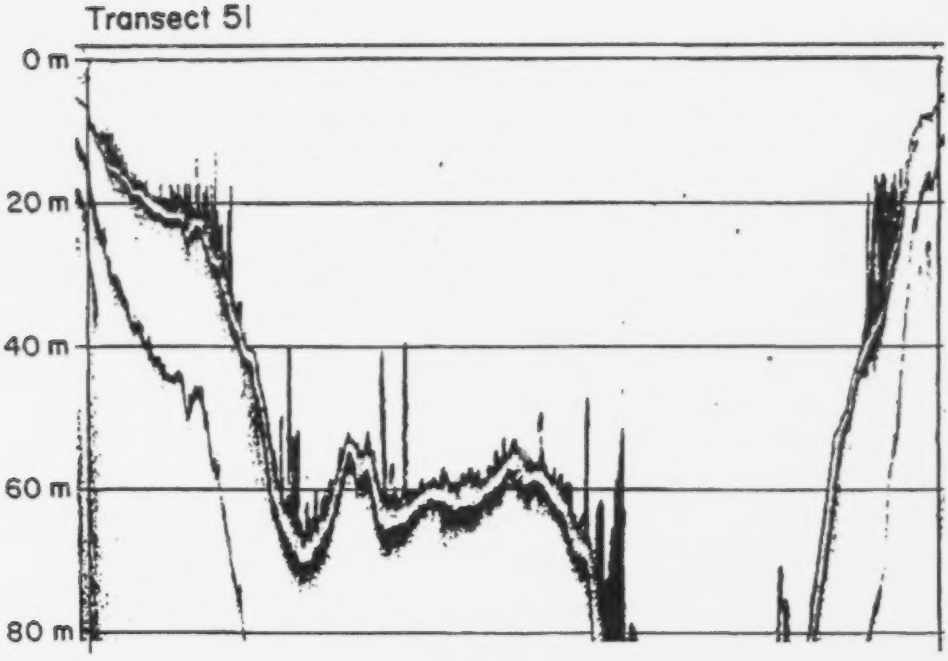
Transect 47 (cont'd)

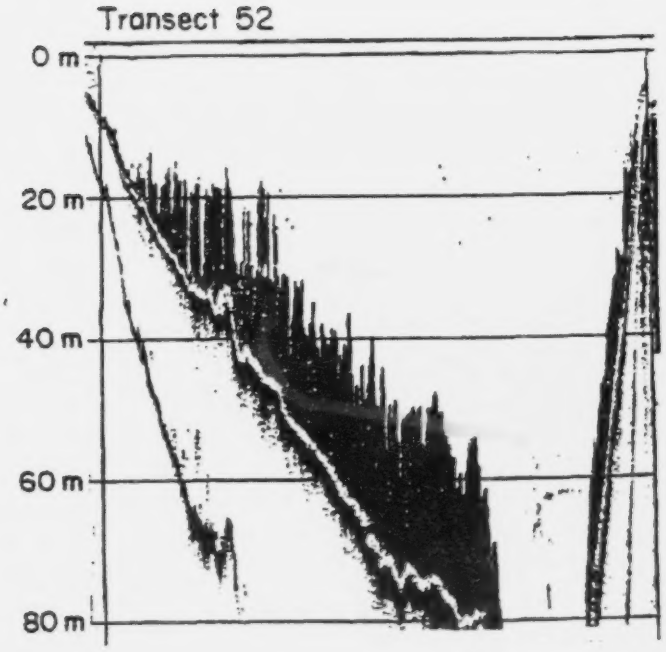


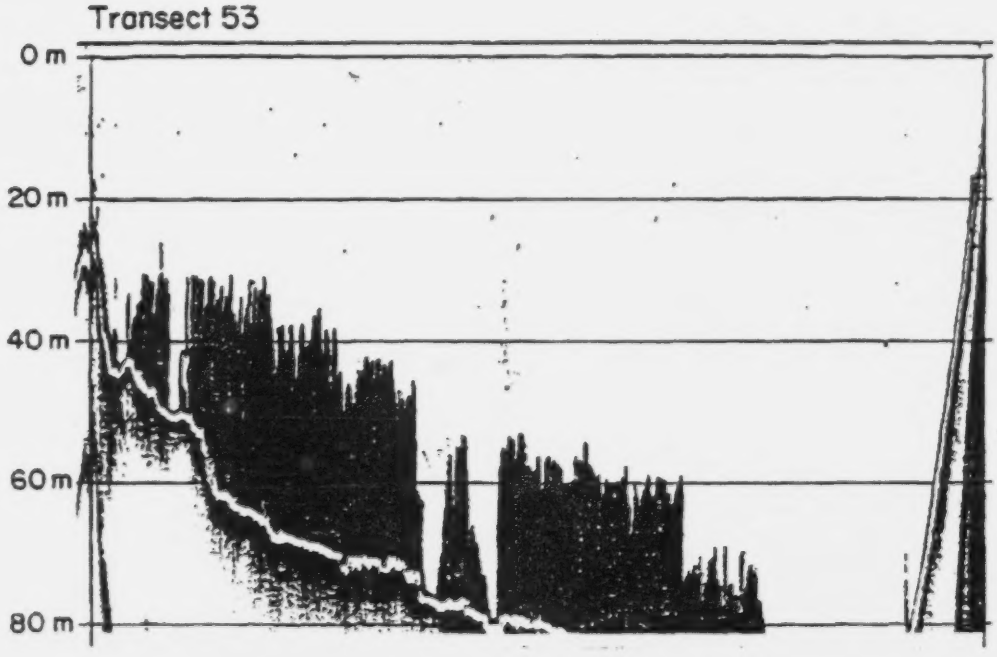

Transect 48
0 m
20 m
40 m
60 m
80 m

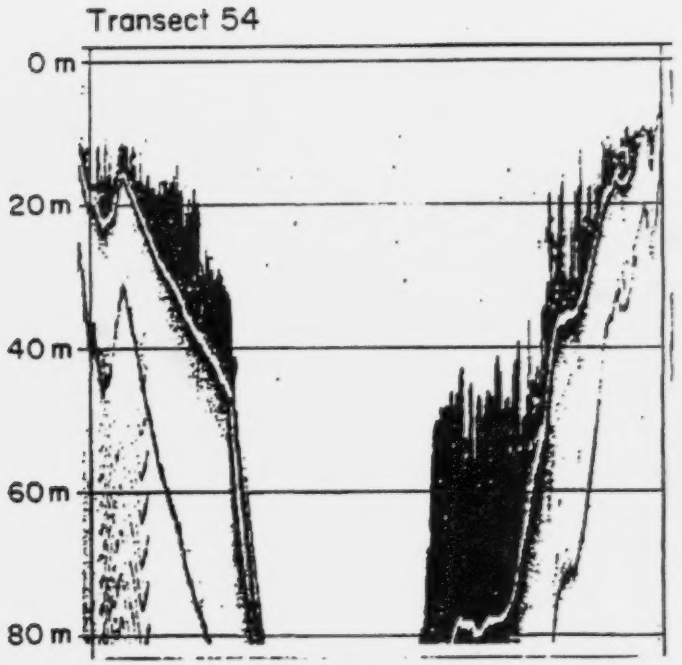

Transect 49
0 m
20 m
40 m
60 m
80 m

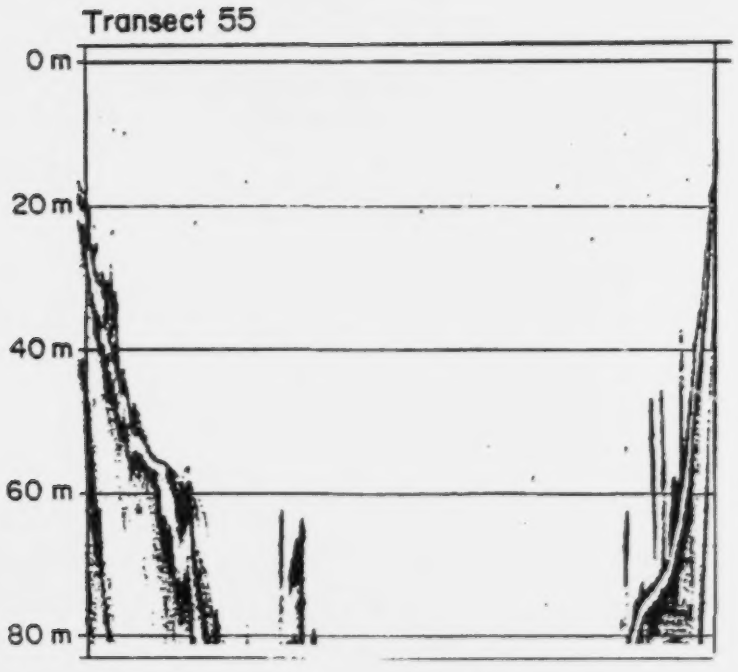

Transect 50
0 m
20 m
40 m
60 m
80 m

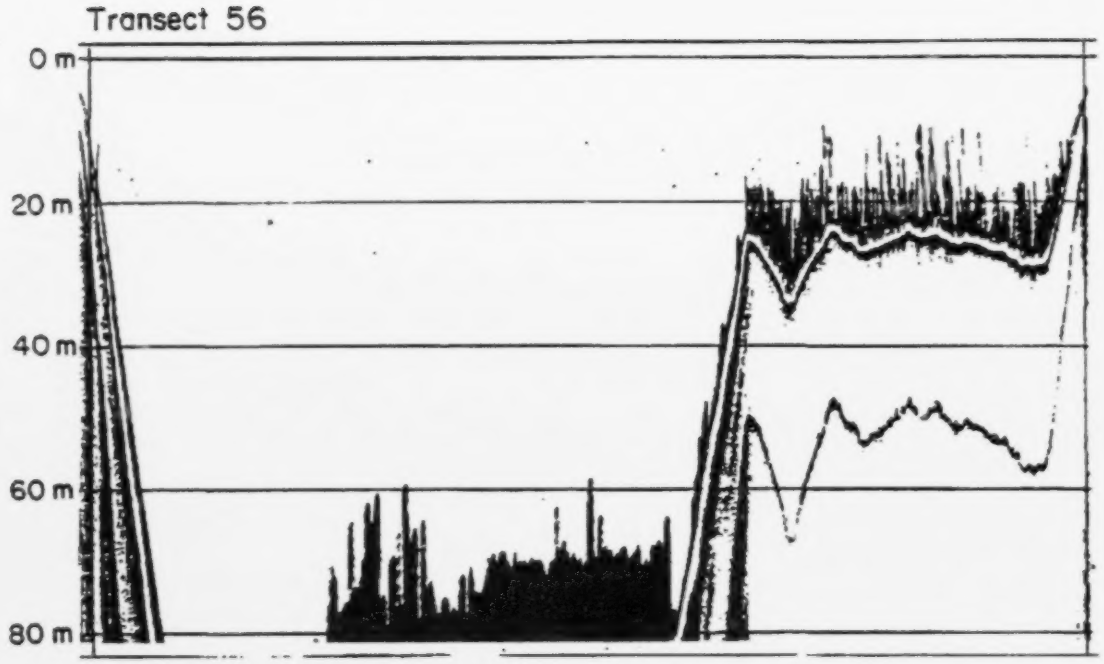

Transect 51
0 m
20 m
40 m
60 m
80 m

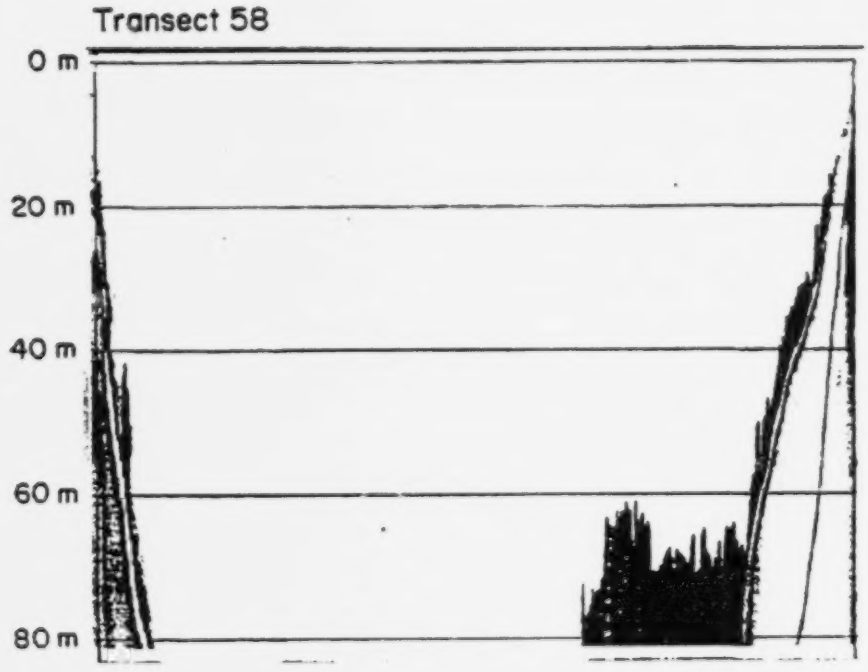

Transect 52
0 m
20 m
40 m
60 m
80 m

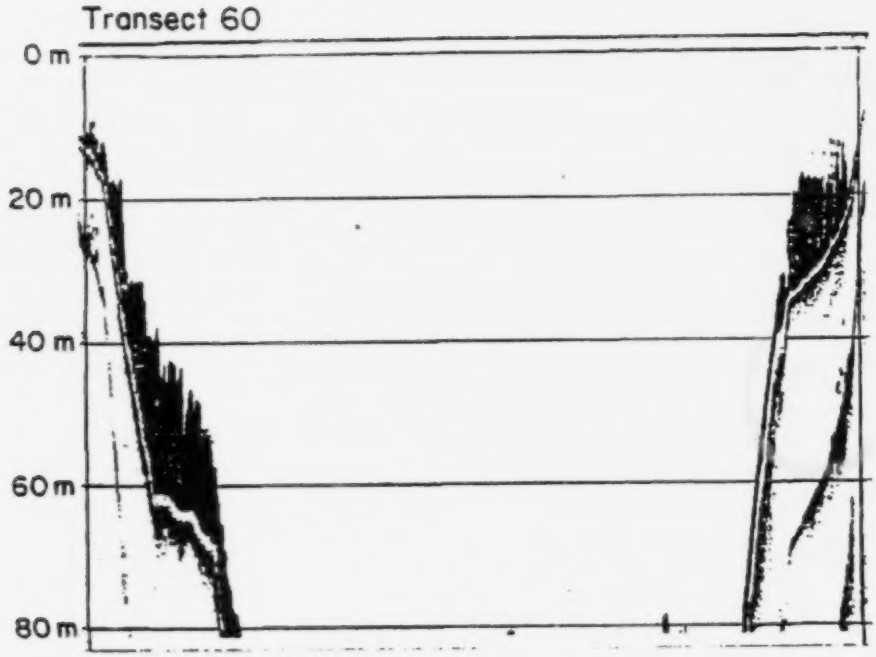

Transect 53
0 m
20 m
40 m
60 m
80 m

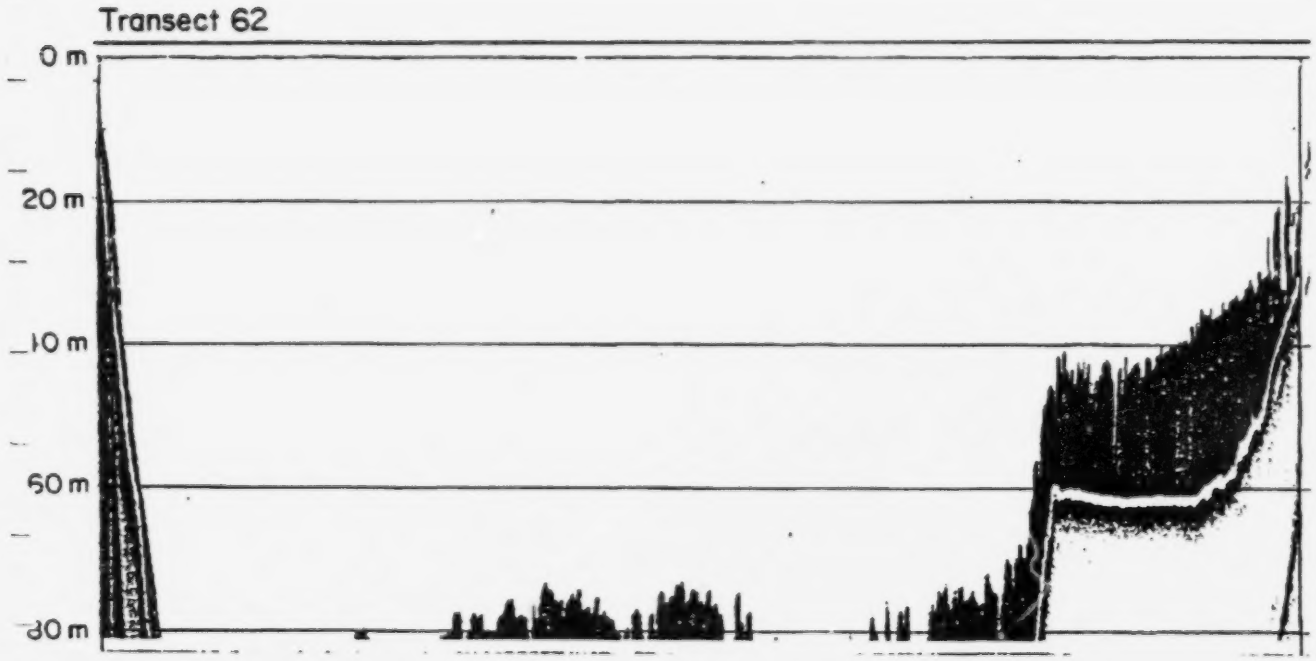

Transect 54
0 m
20 m
40 m
60 m
80 m

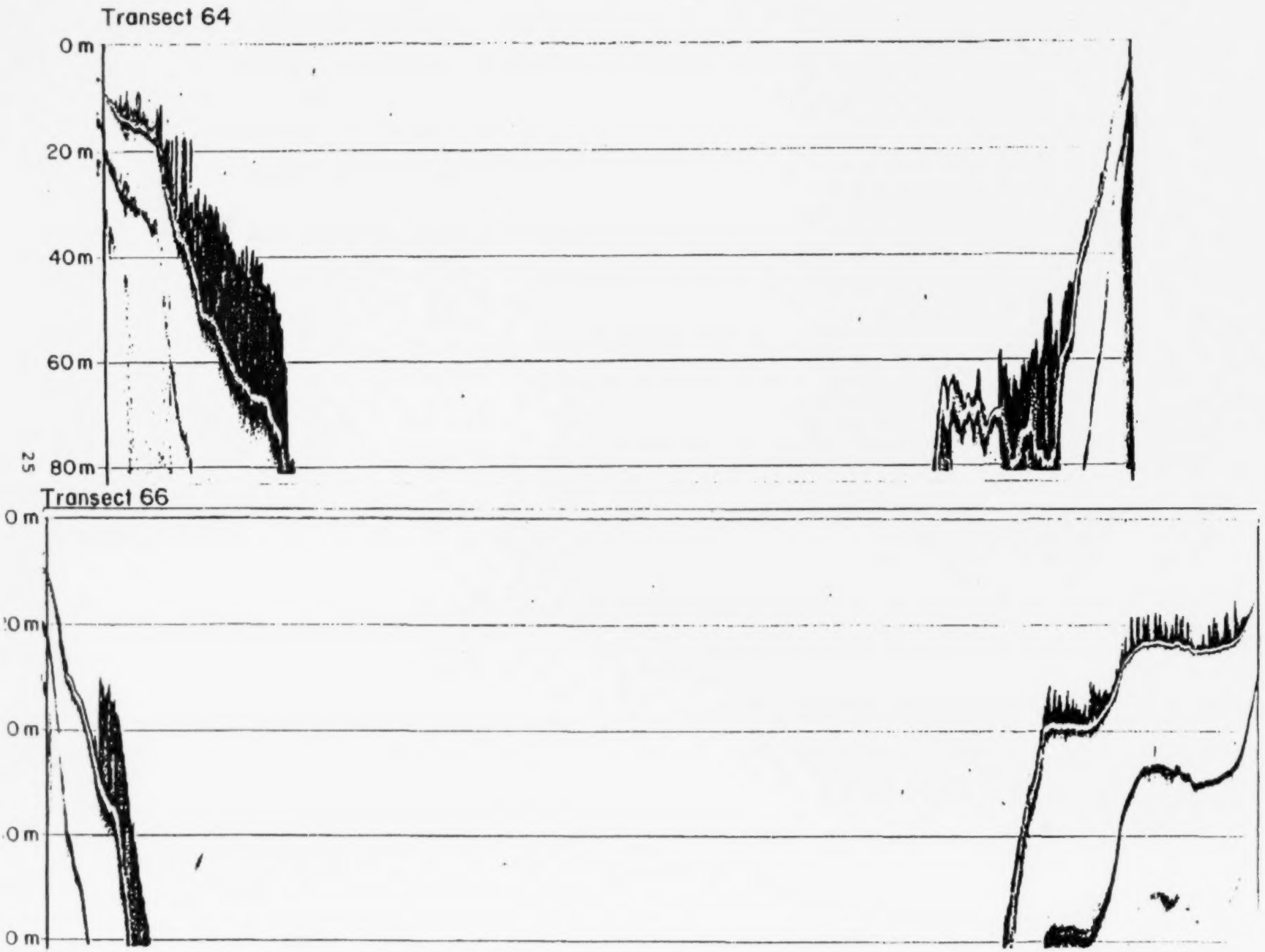

Transect 55
0 m
20 m
40 m
60 m
80 m

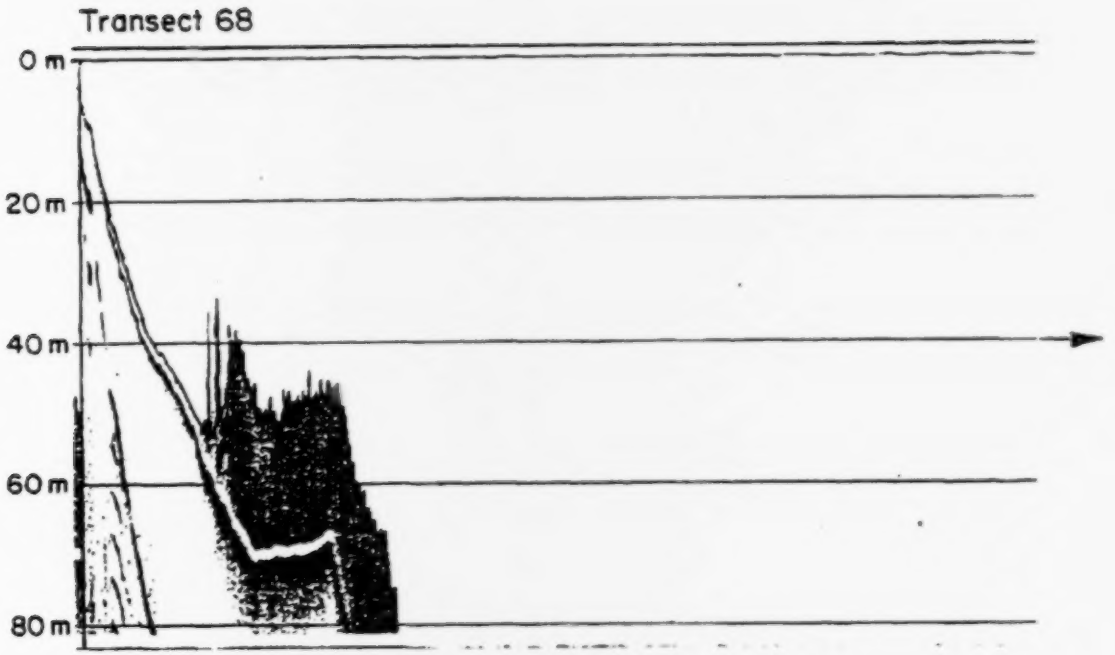

Transect 56
0 m
20 m
40 m
60 m
80 m

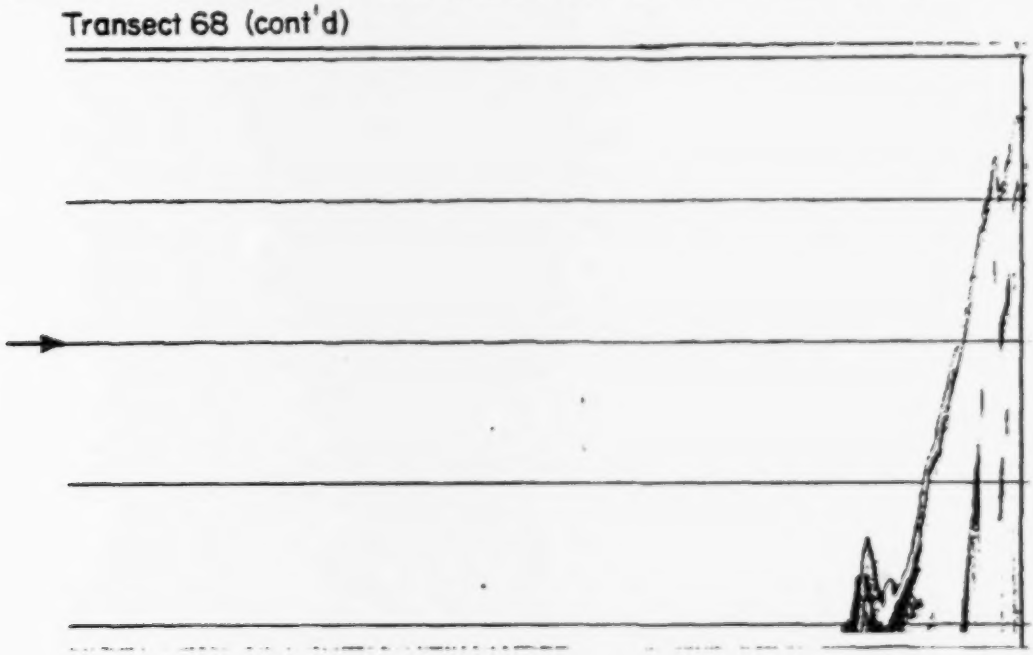

Transect 58
0 m
20 m
40 m
60 m
80 m

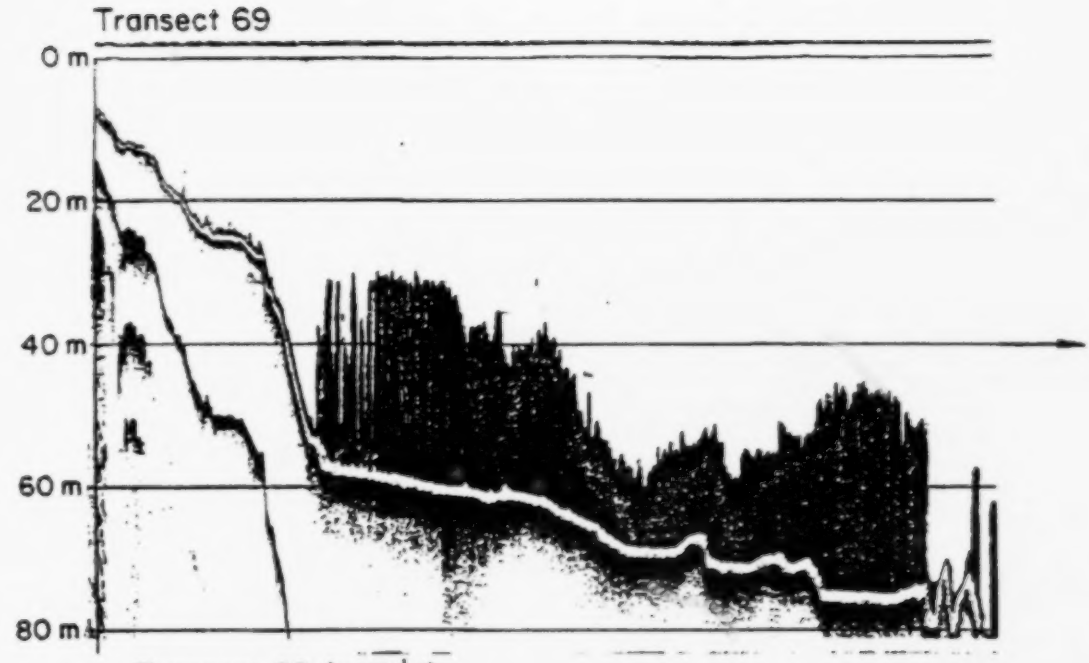

Transect 60
0 m
20 m
40 m
60 m
80 m

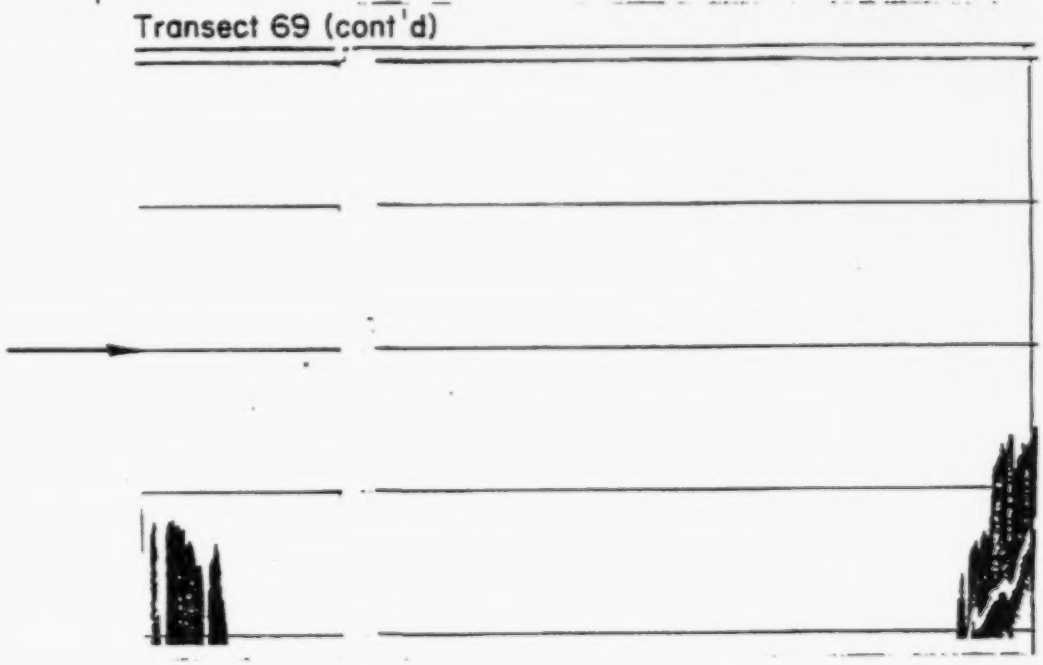

Transect 62
0 m
20 m
60 m


Transect 64
0 m
20 m
40m
60m
80m
25
Transect 66
0 m
0m
0 m
0m
0 m

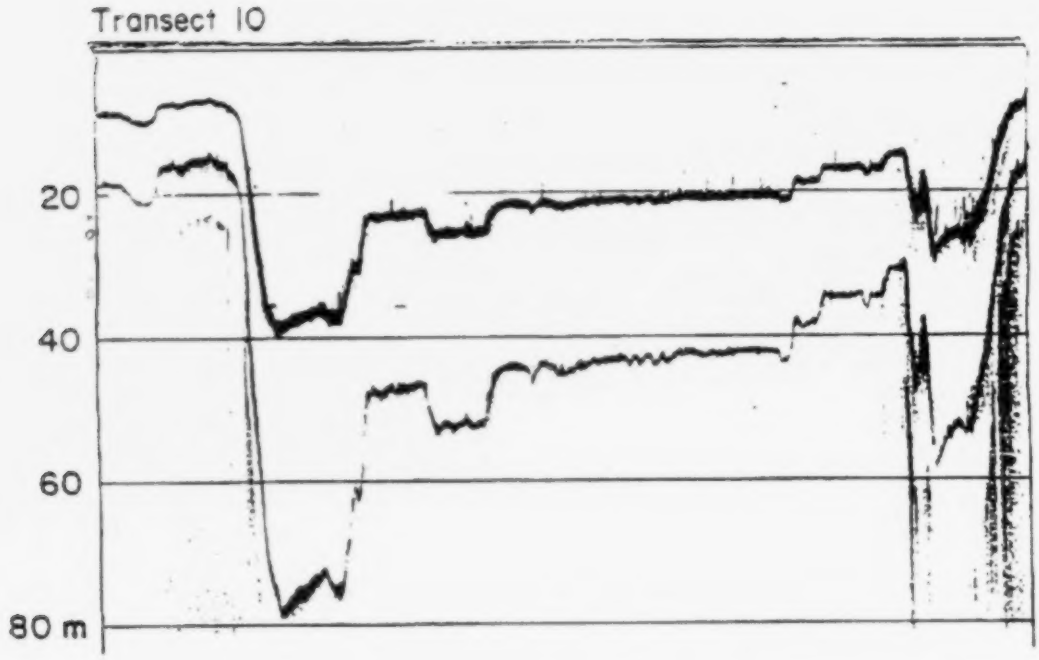

Transect 68
0 m
20 m
40 m
60 m
80 m

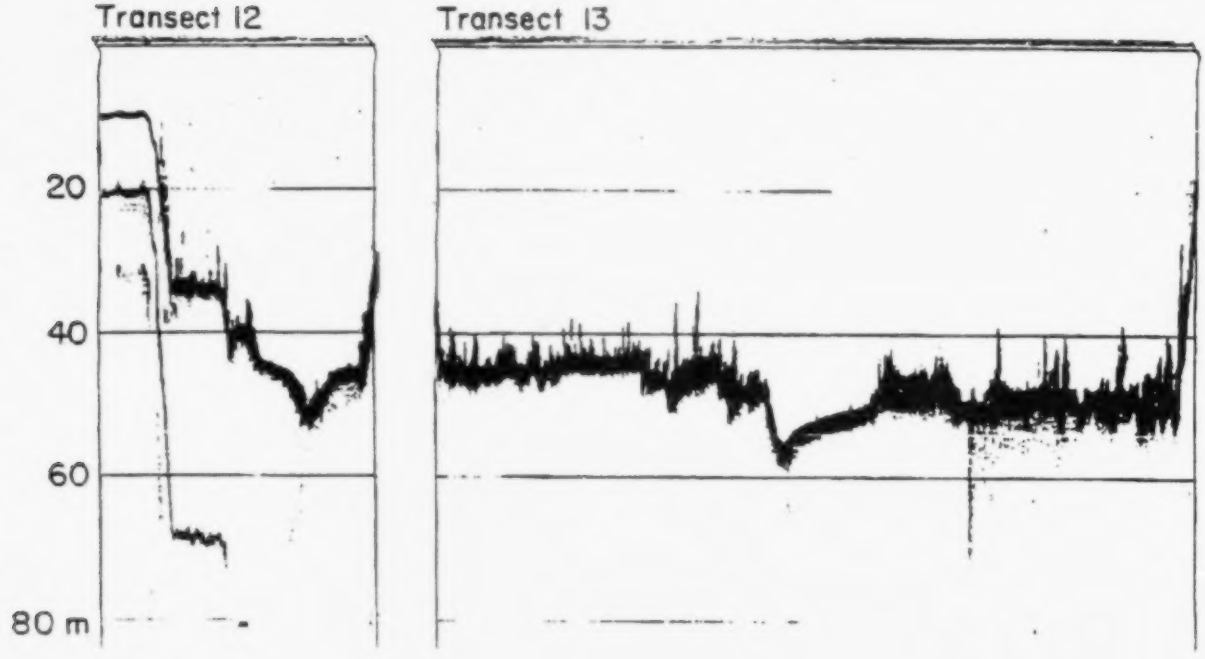

Transect 68 (cont'd)


Transect 69
0 m
20 m
40 m
60 m
80 m

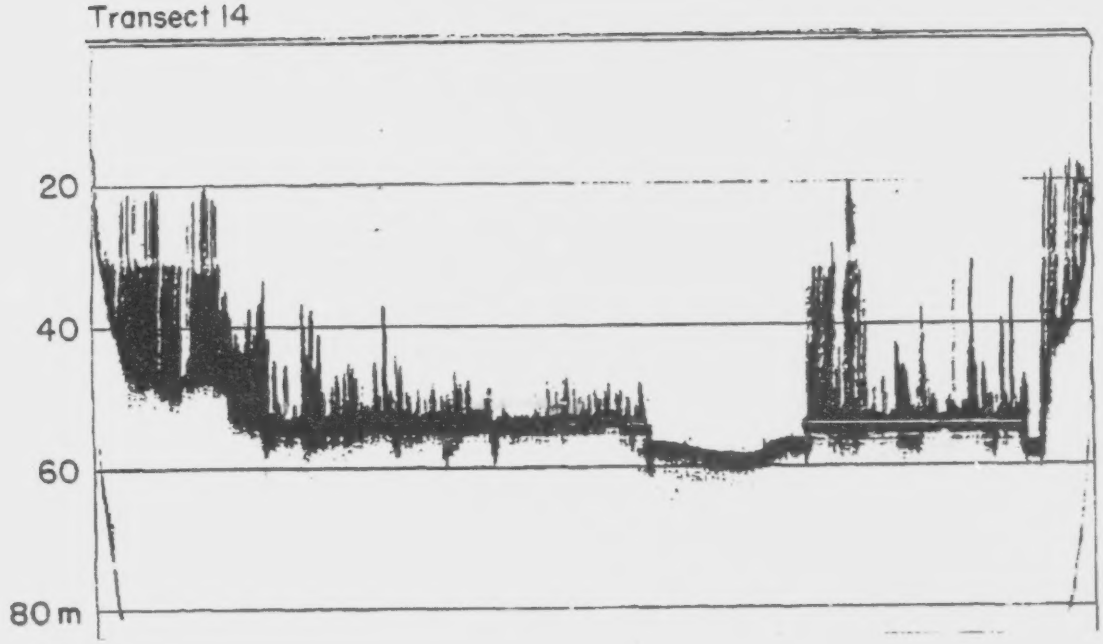

Transect 69 (cont'd)

6.7.2 - Appendix G2 - September 1988

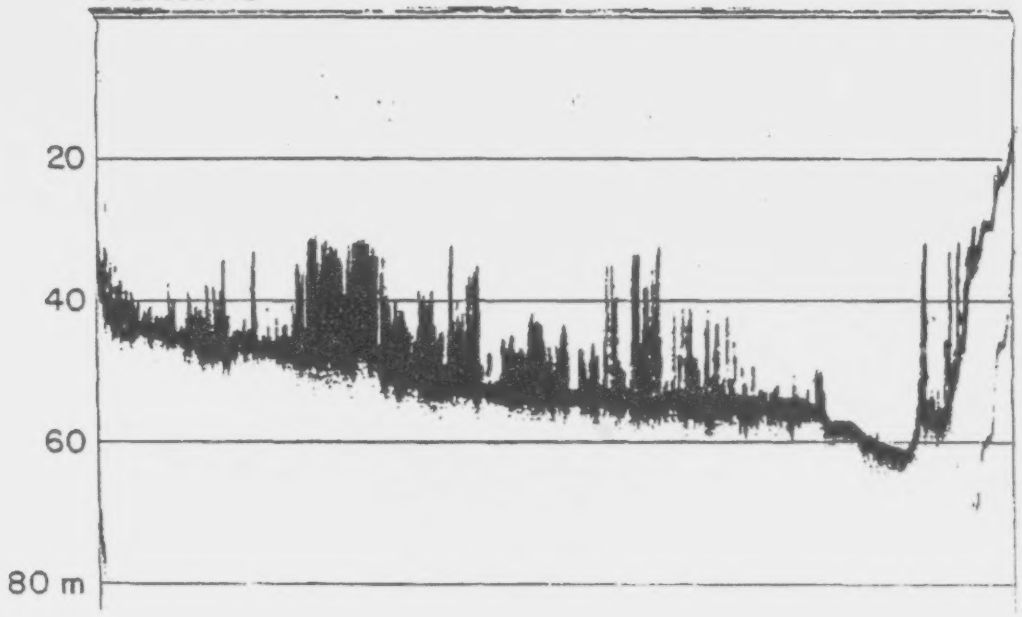

Transect 10
20
40
60
80 m

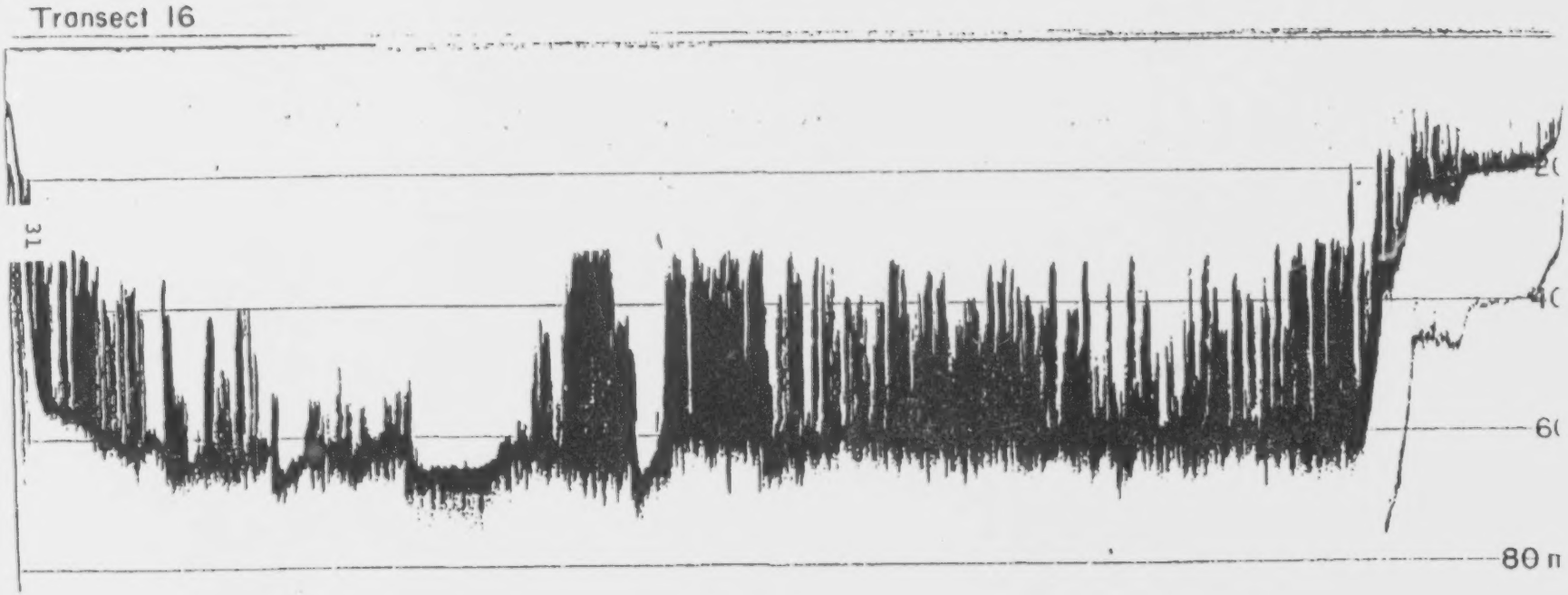

Transect 12
Transect 13
20
40
60
80 m

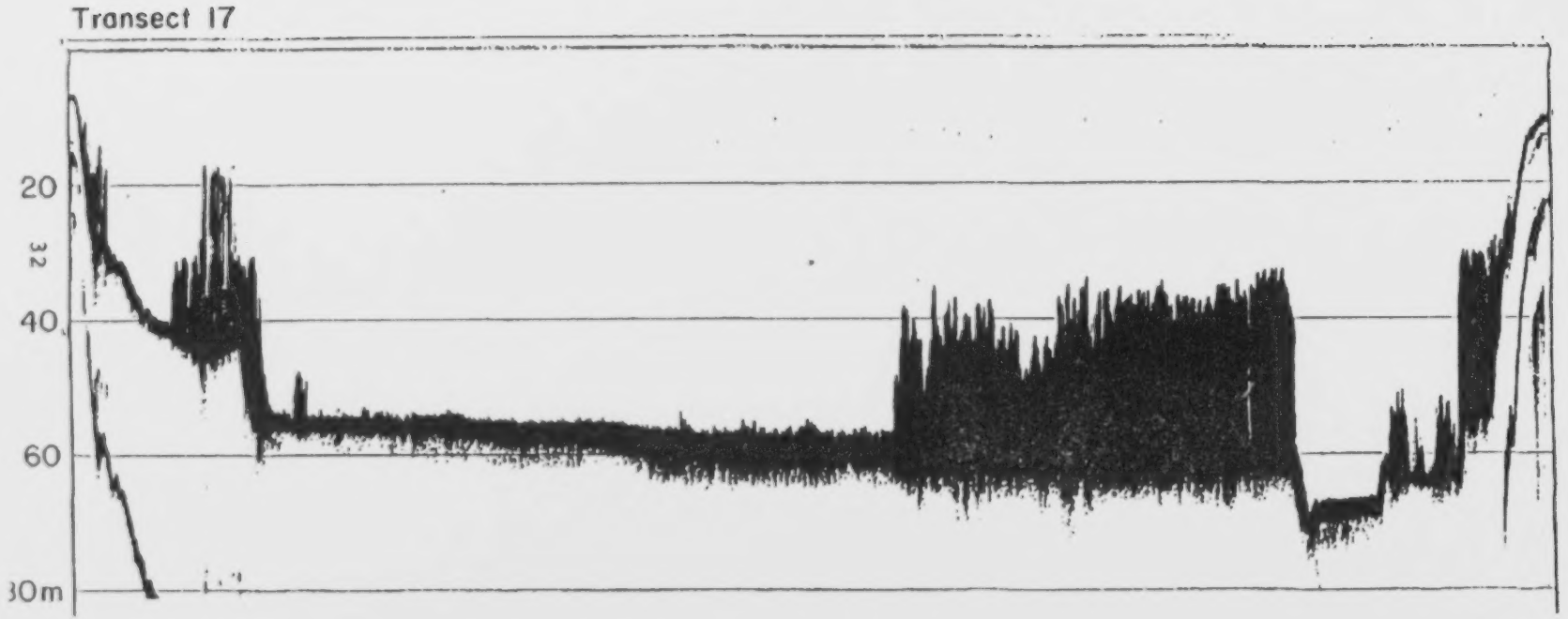
Transect 14



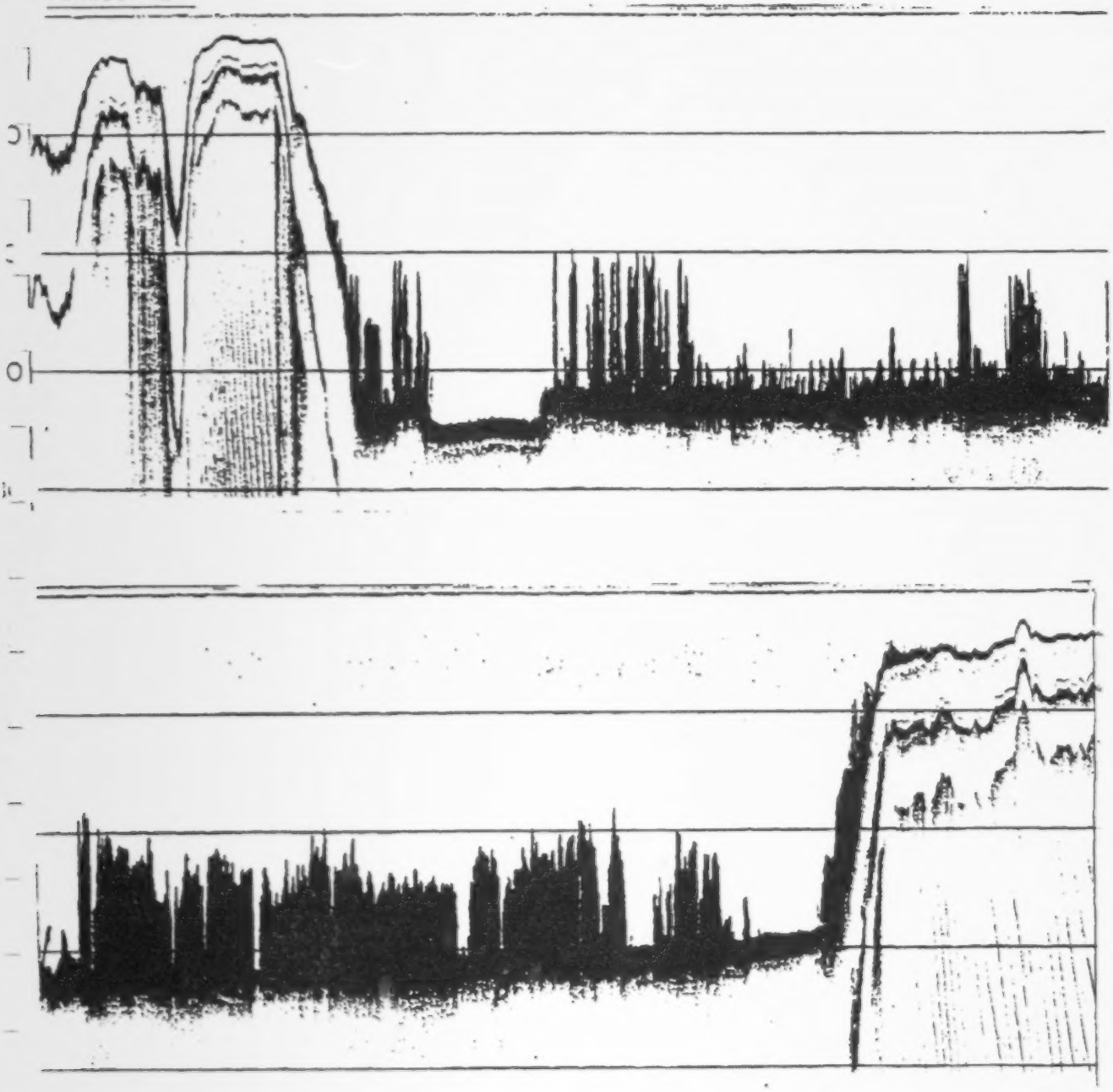
Transect 15

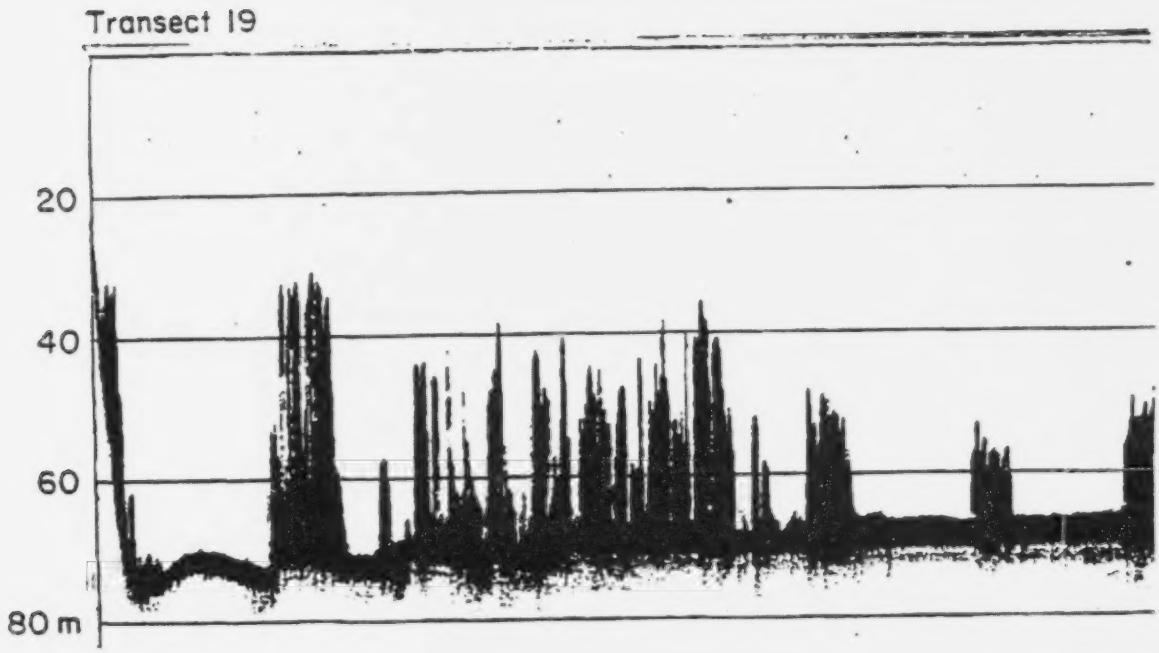


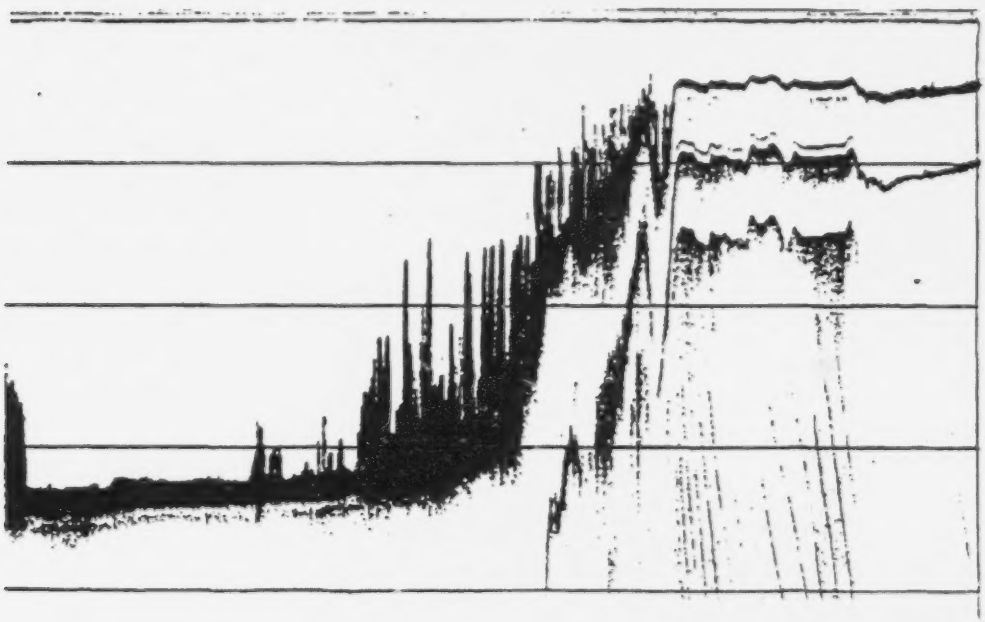

Transect 16
31
80 m

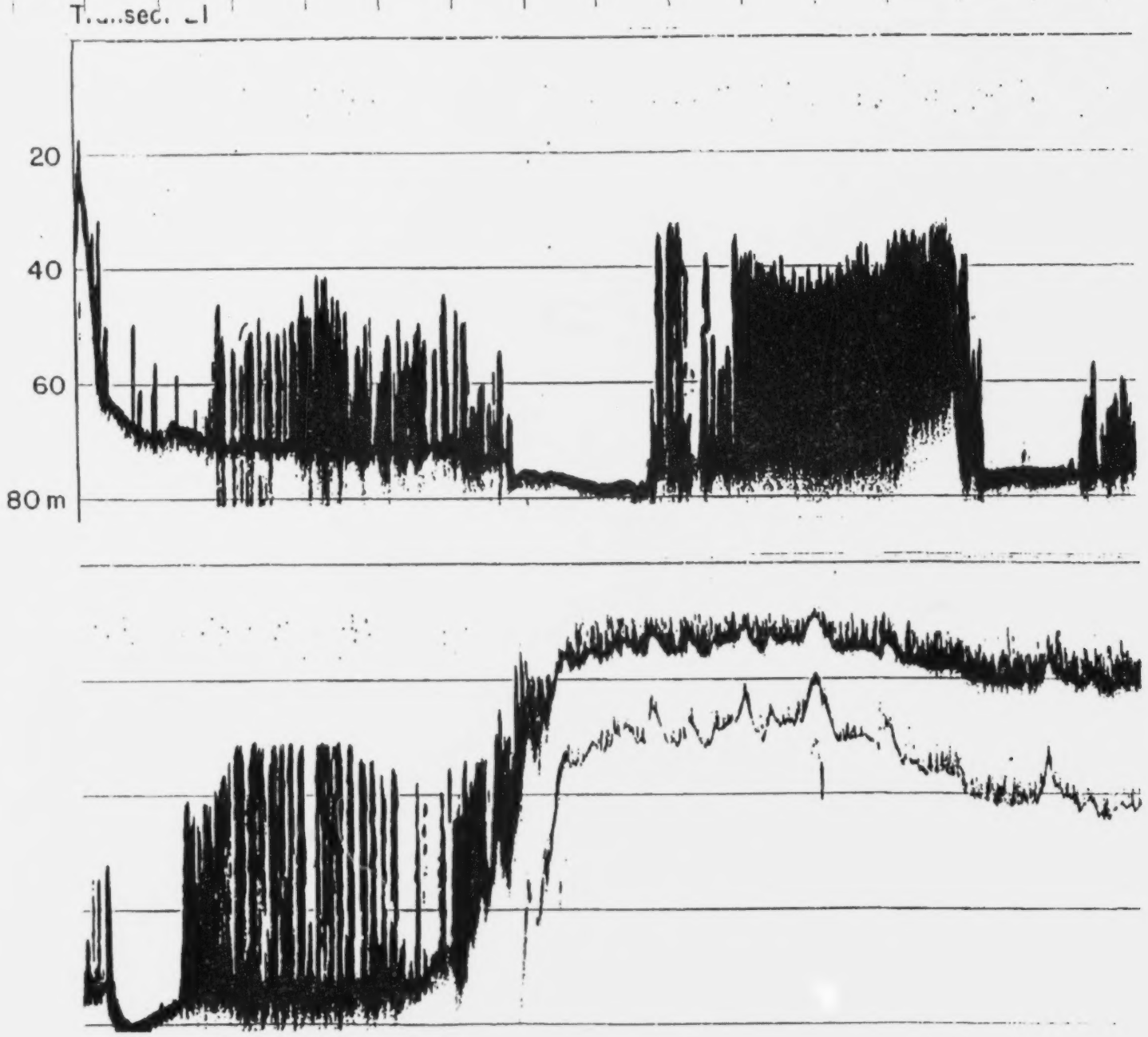

Transect 17
20
32
40
60
30m

Transect 18

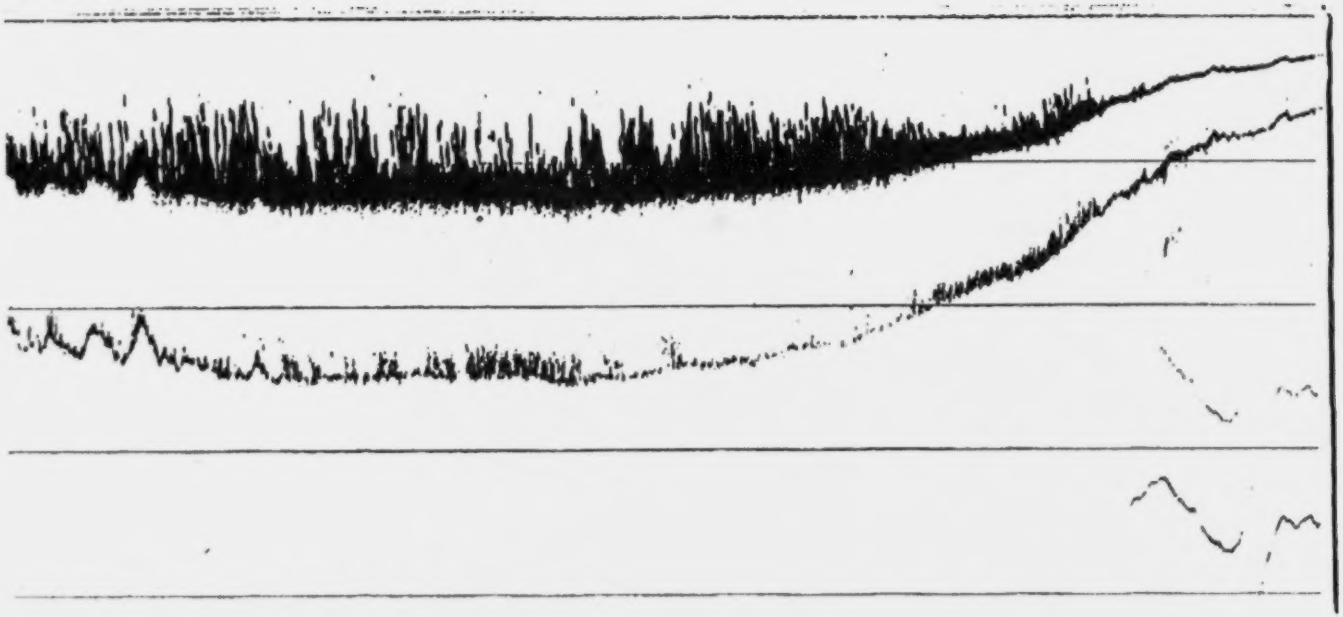


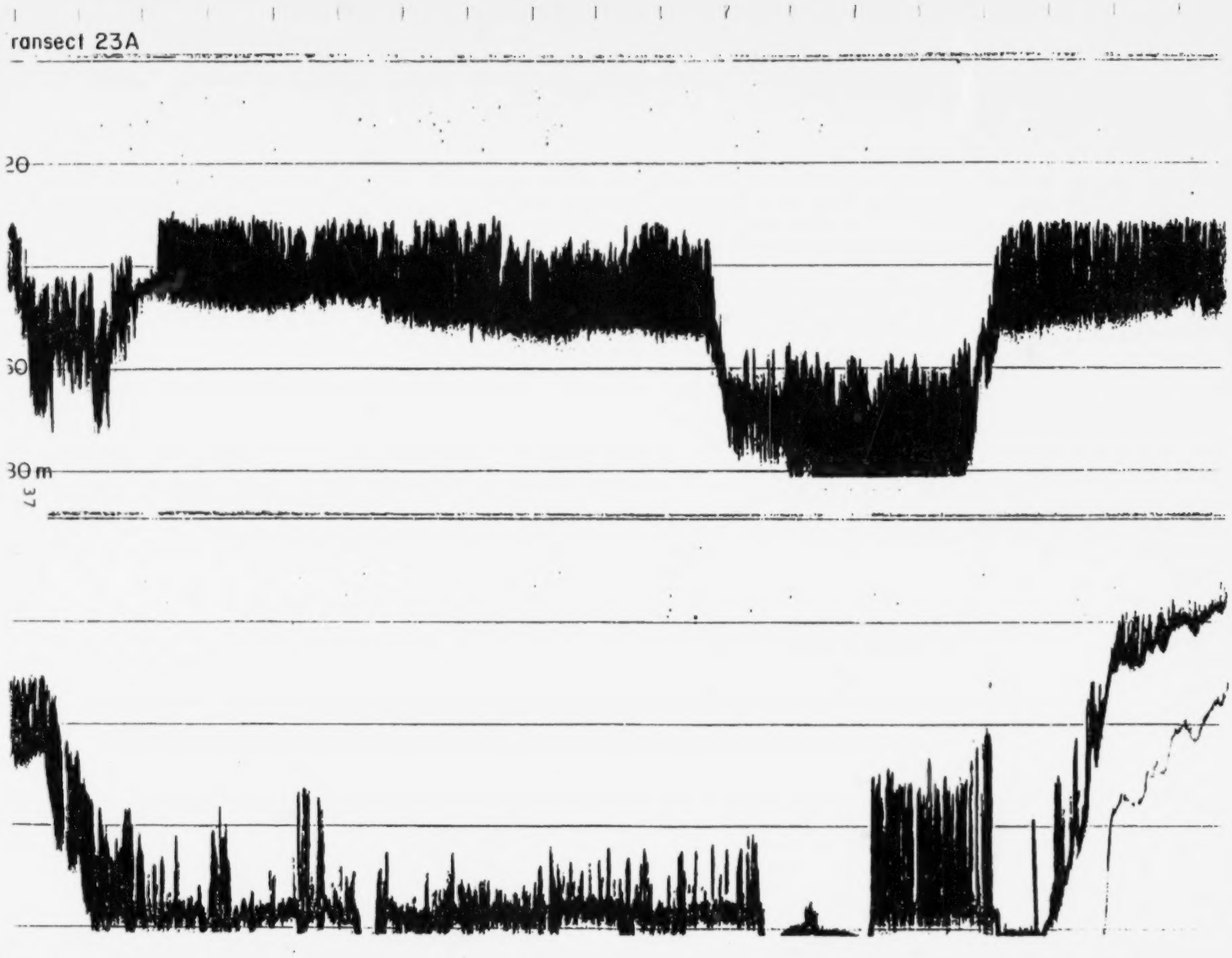

Transect 19
20
40
60
80 m

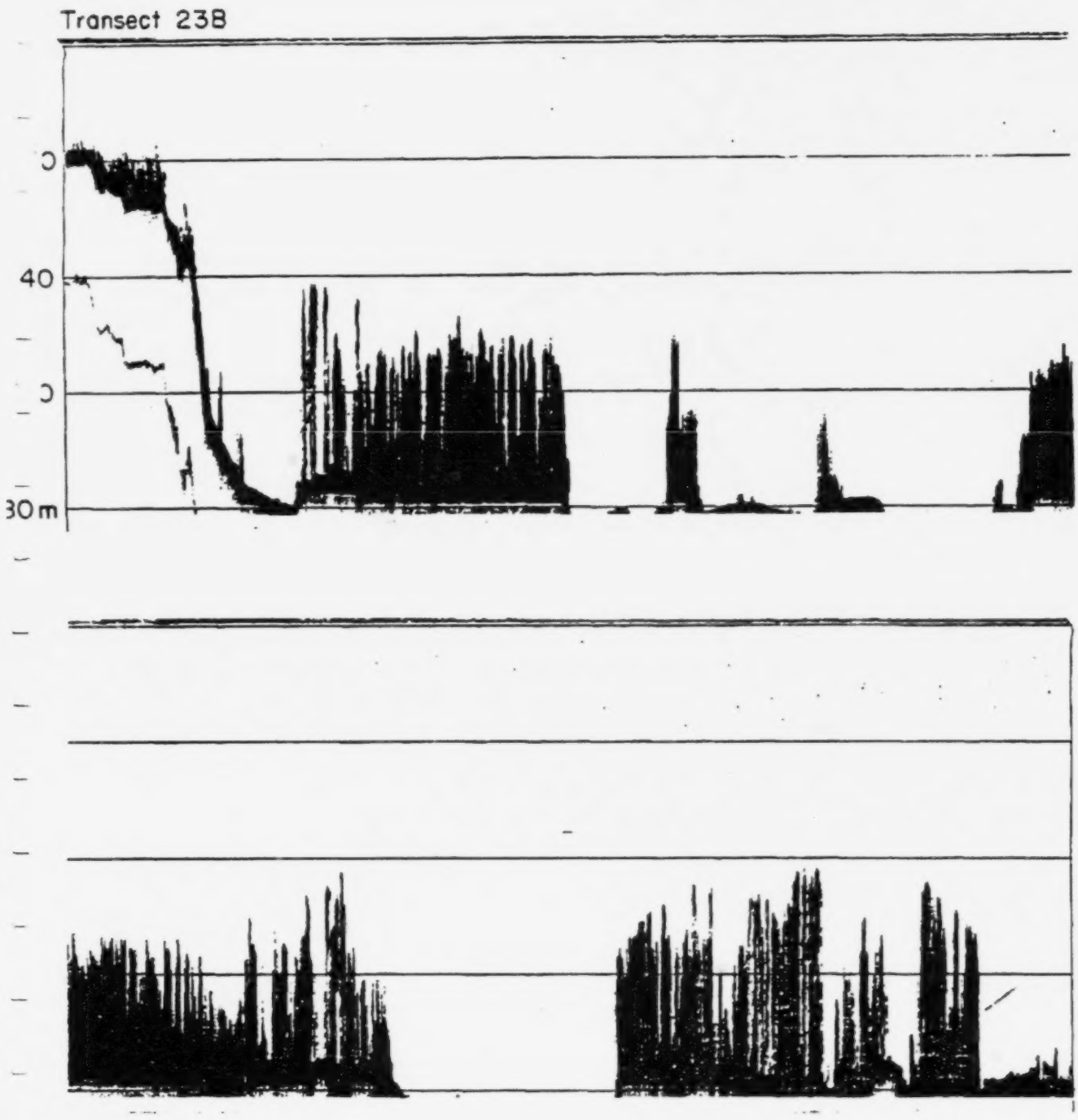



20
40
60
80 m

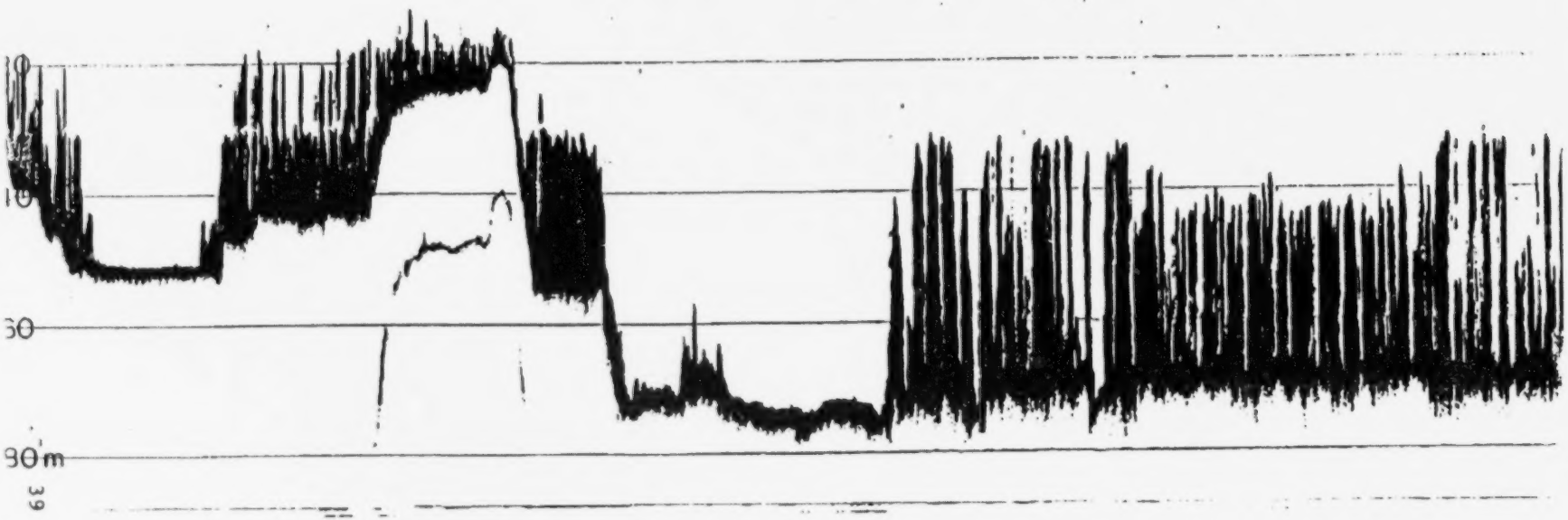
Transect 21. (cont'd)

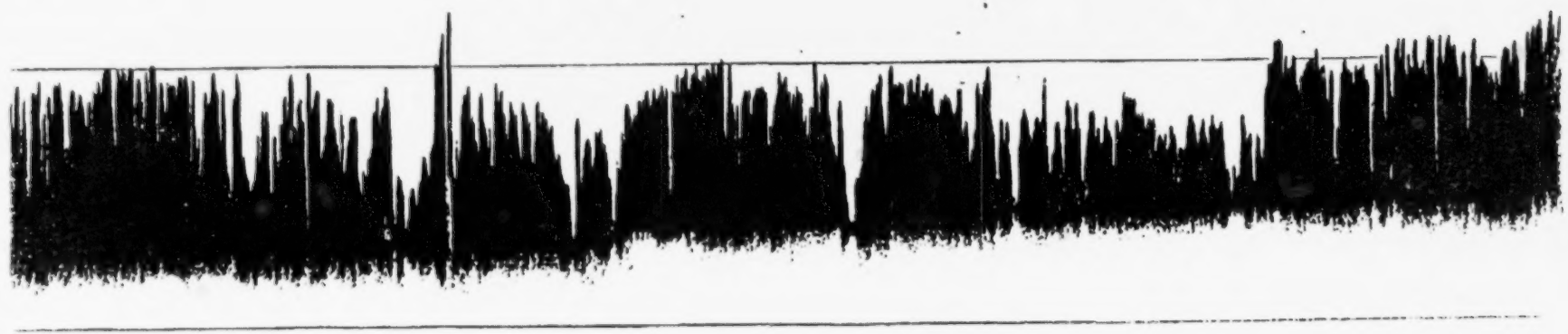


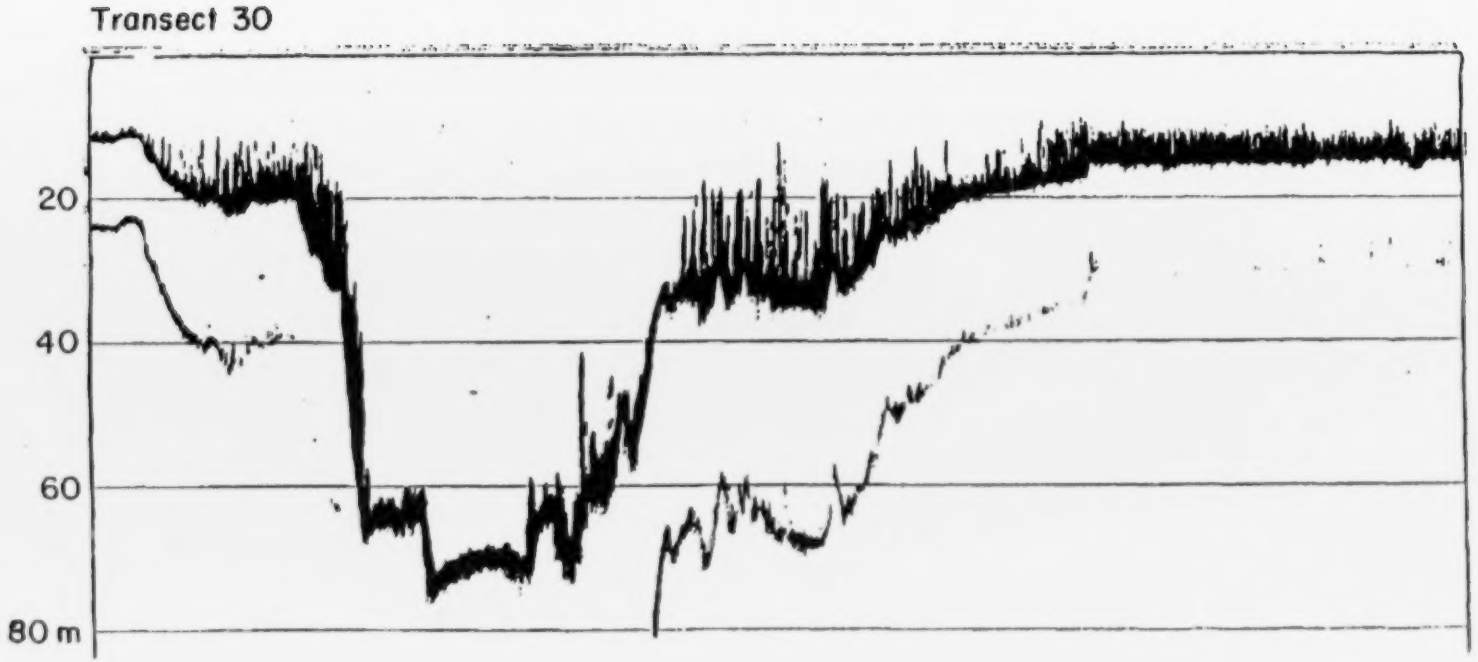

ransect 23A
20
30
30m
37

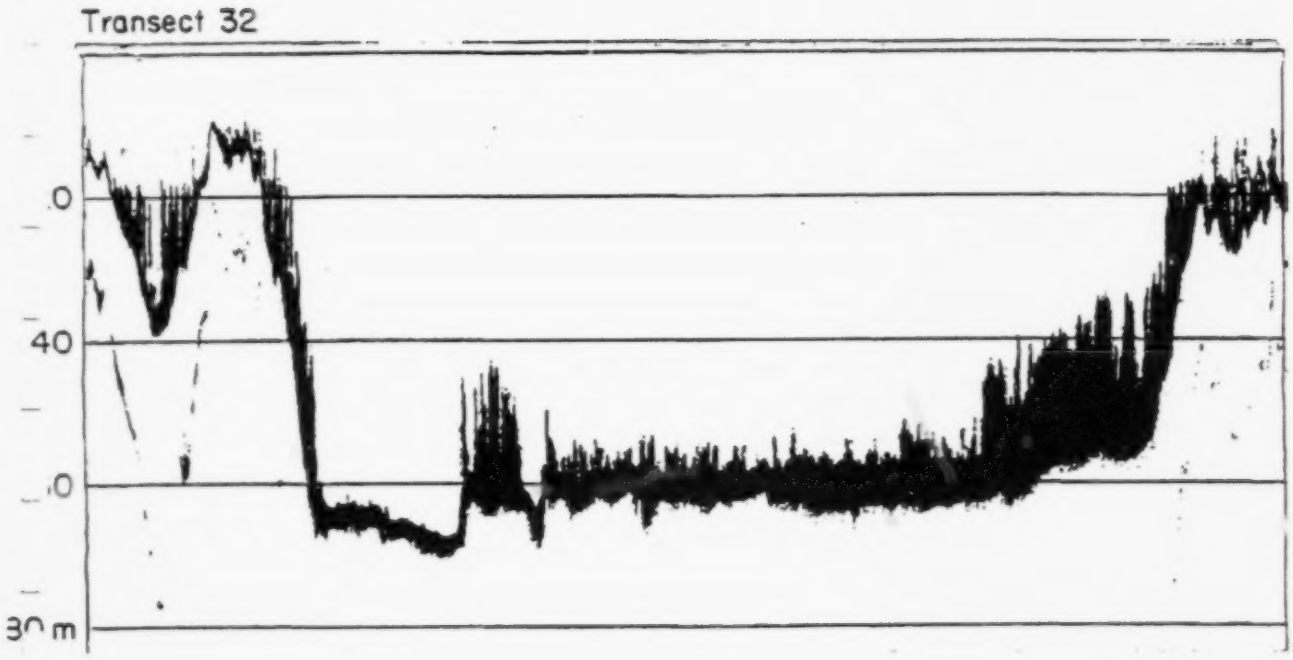

Transect 238
0
40
0
30 m

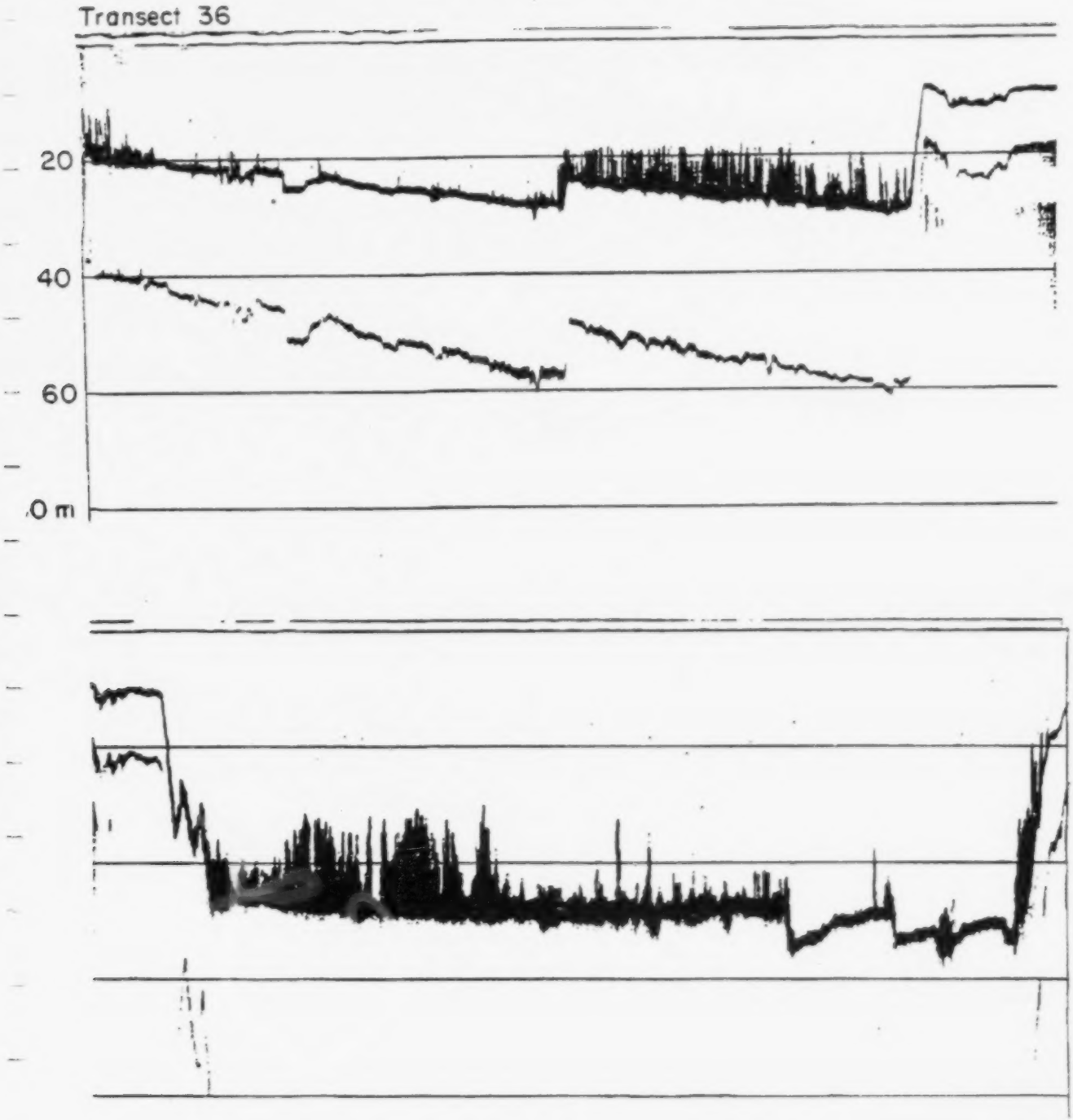
ransect 25

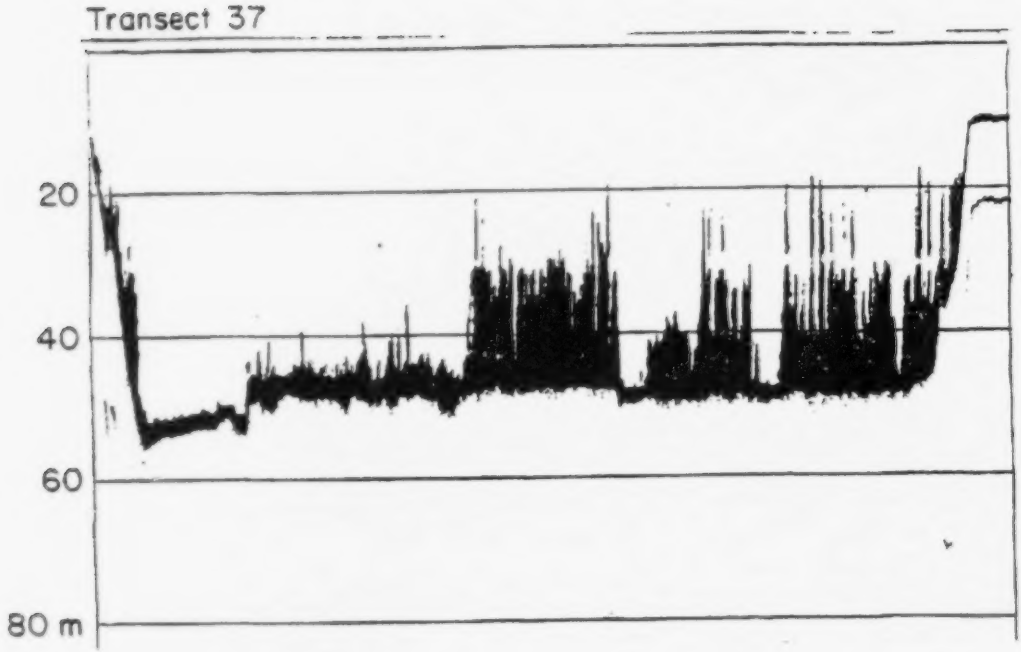


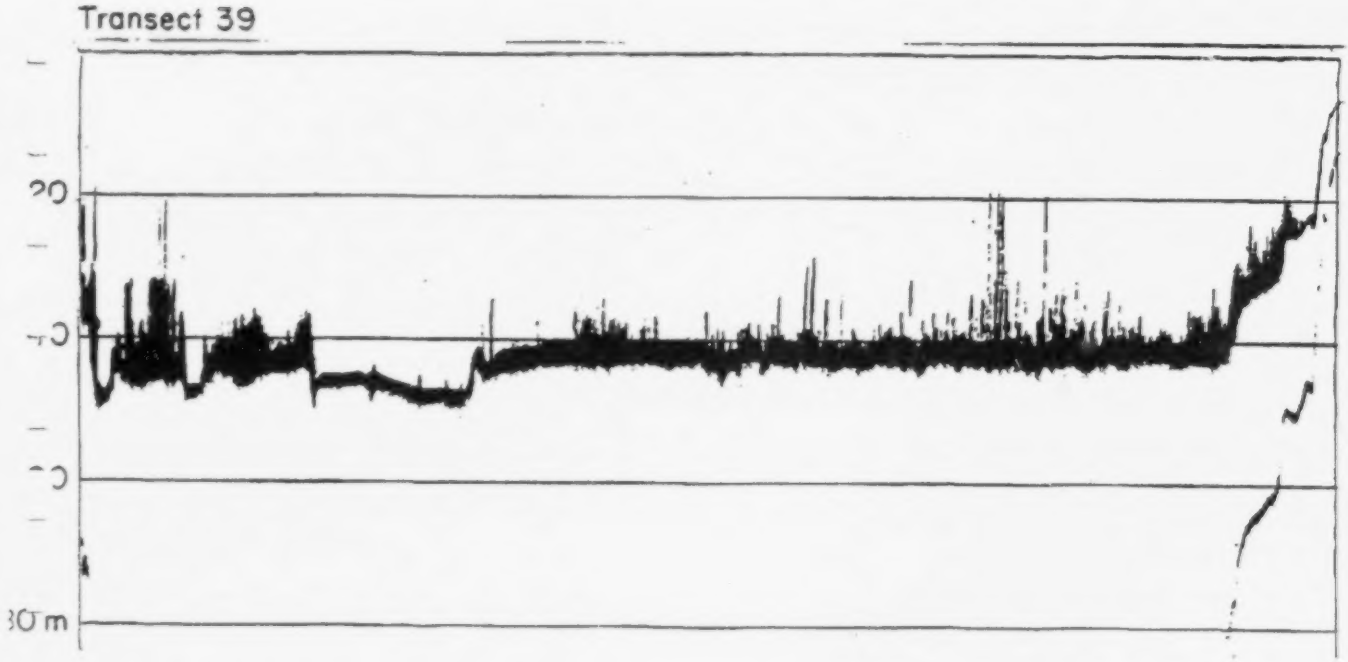


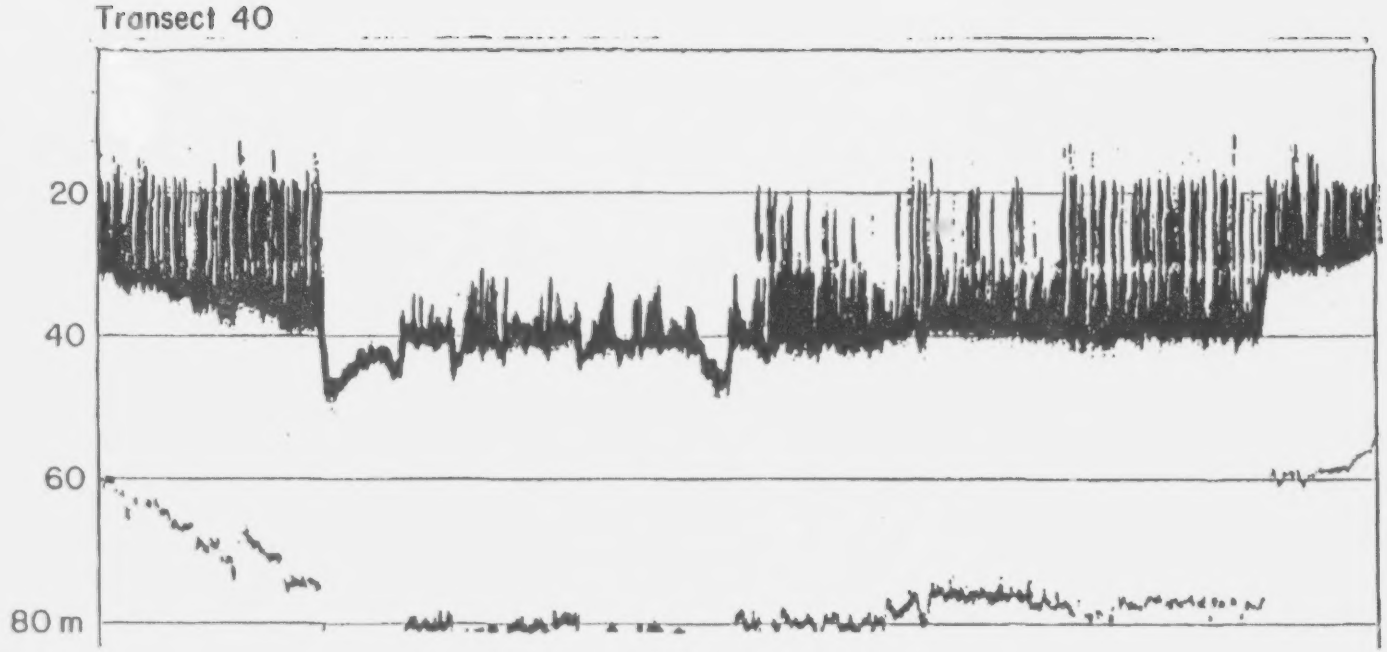

Transect 30
20
40
60
80 m

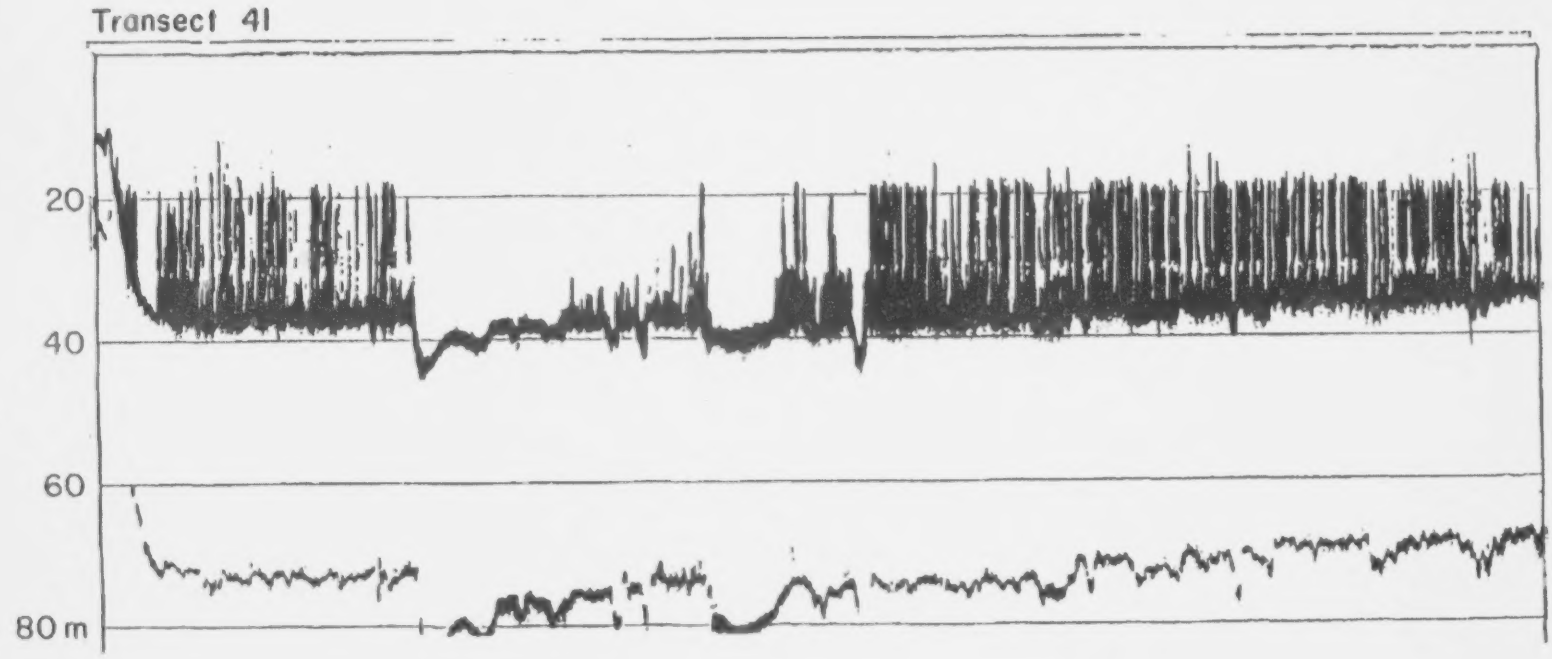

Transect 32
0
40
0
30 m

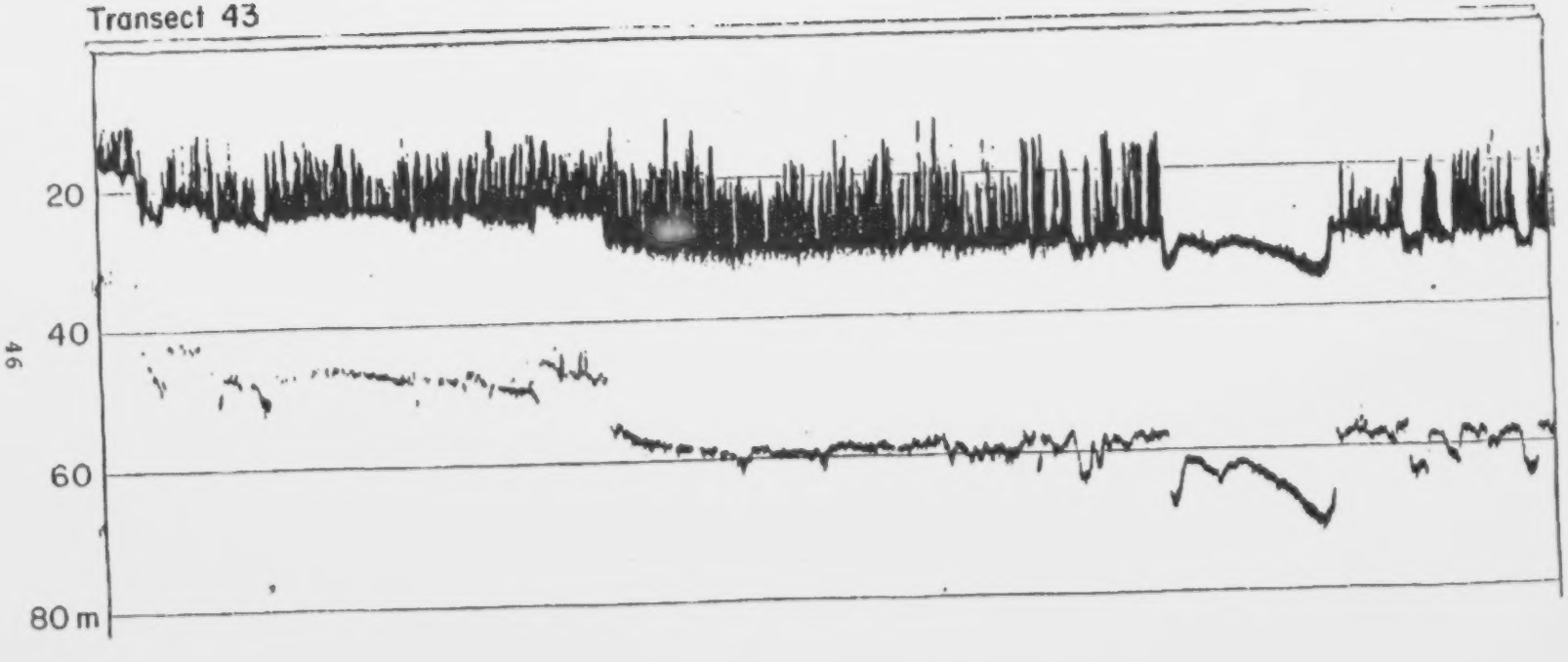

Transect 36
20
40
60
0 m


Transect 37
20
40
60
80 m

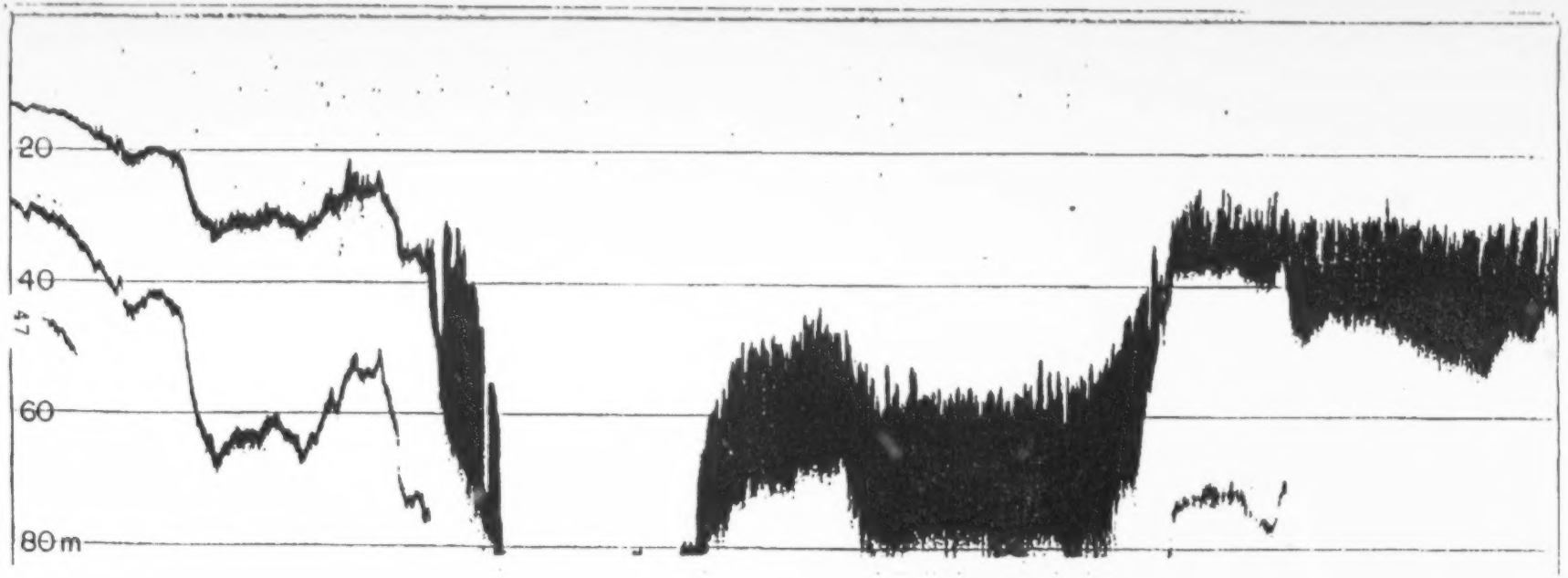

Transect 39
20
80 m

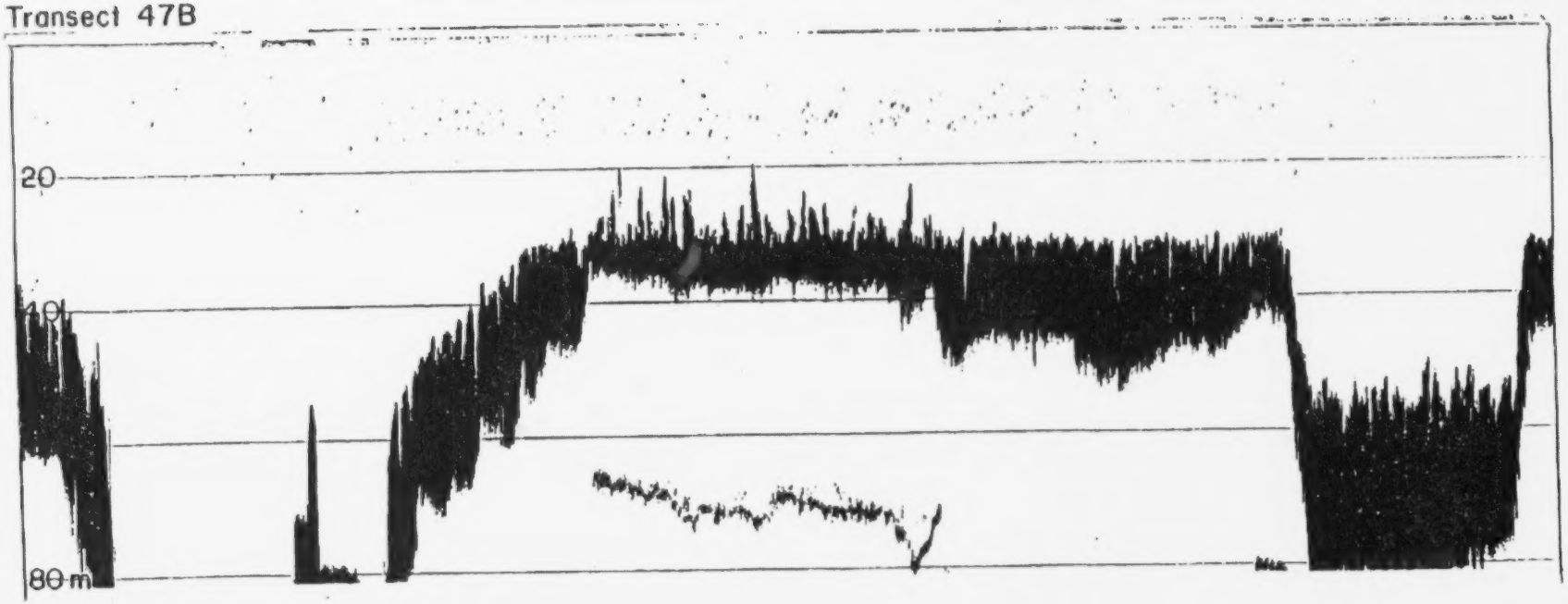

Transect 40
20
40
60
80 m


Transect 41
20
40
60
80 m

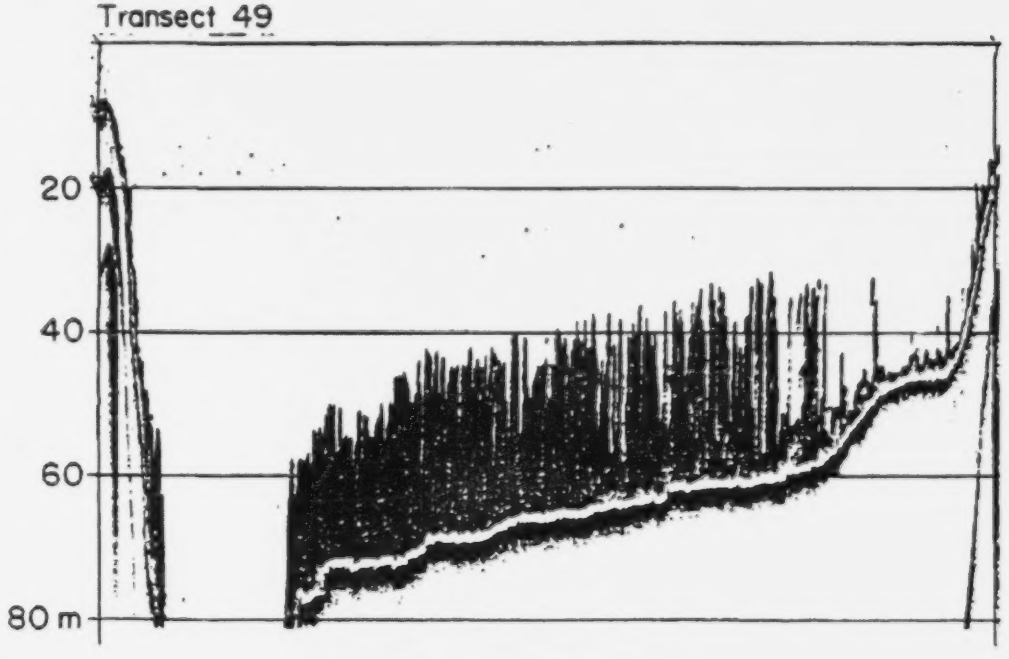

Transect 43
20
40
60
80 m

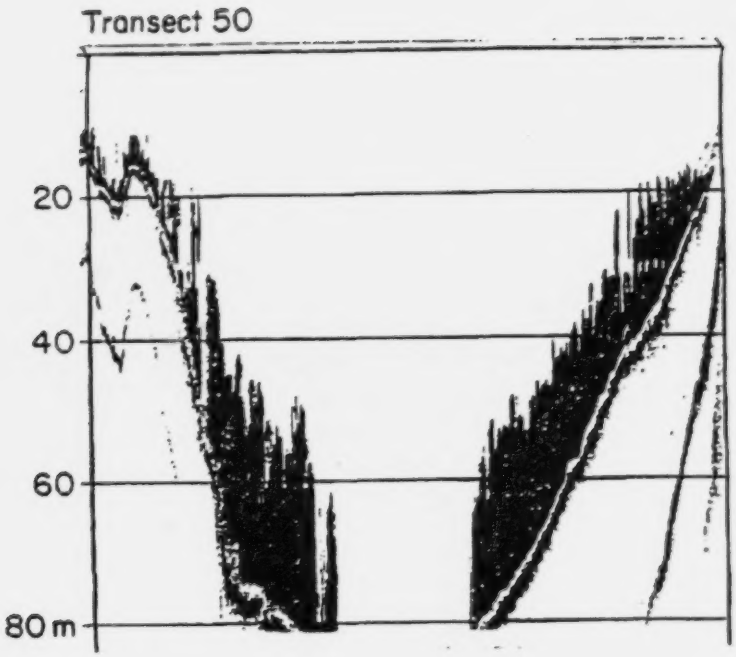
Transect 47A

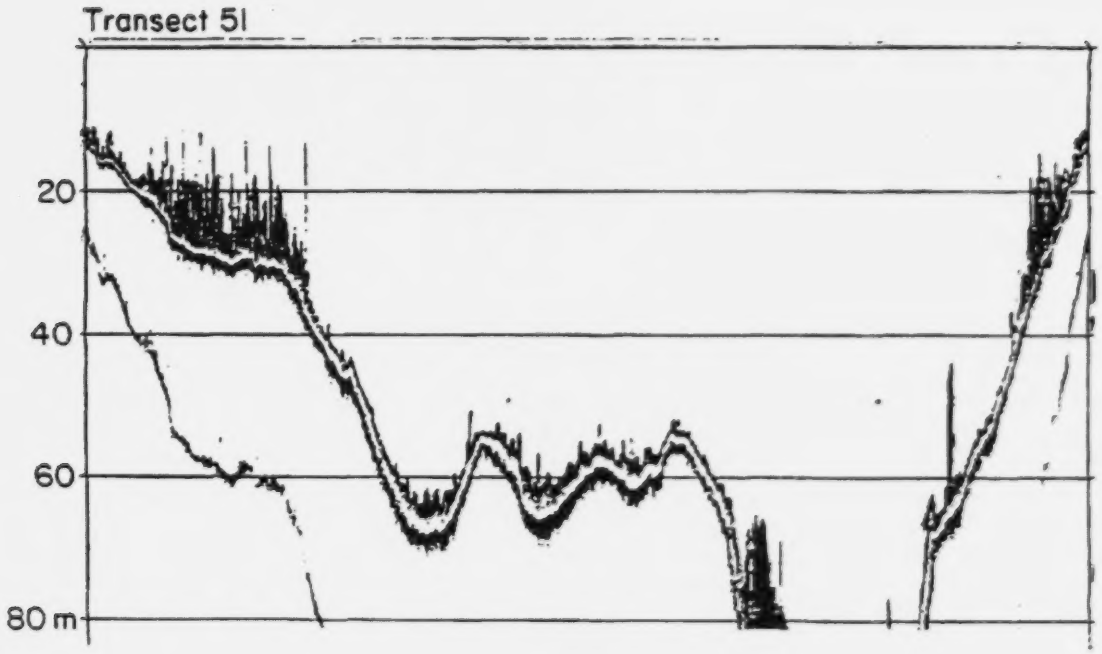



Transect 47B
20
40
80 m

Transect 48
20
40
60
80 m


Transect 49
20
40
60
80 m


Transect 50
20
40
60
80 m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40
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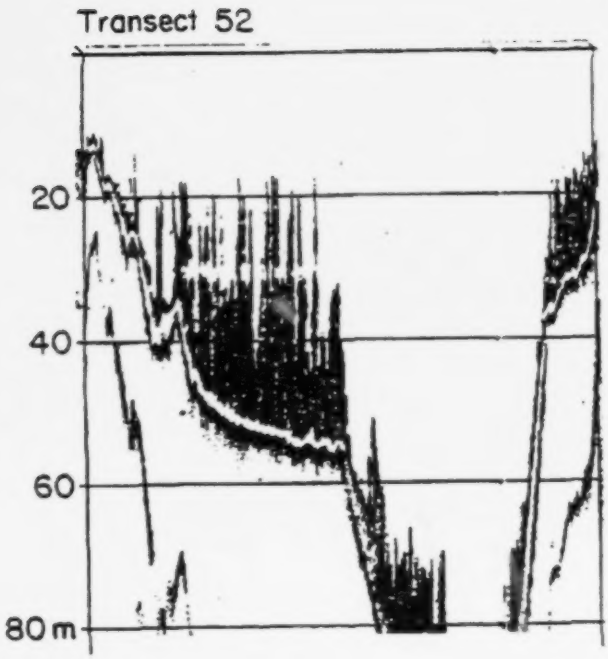
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60
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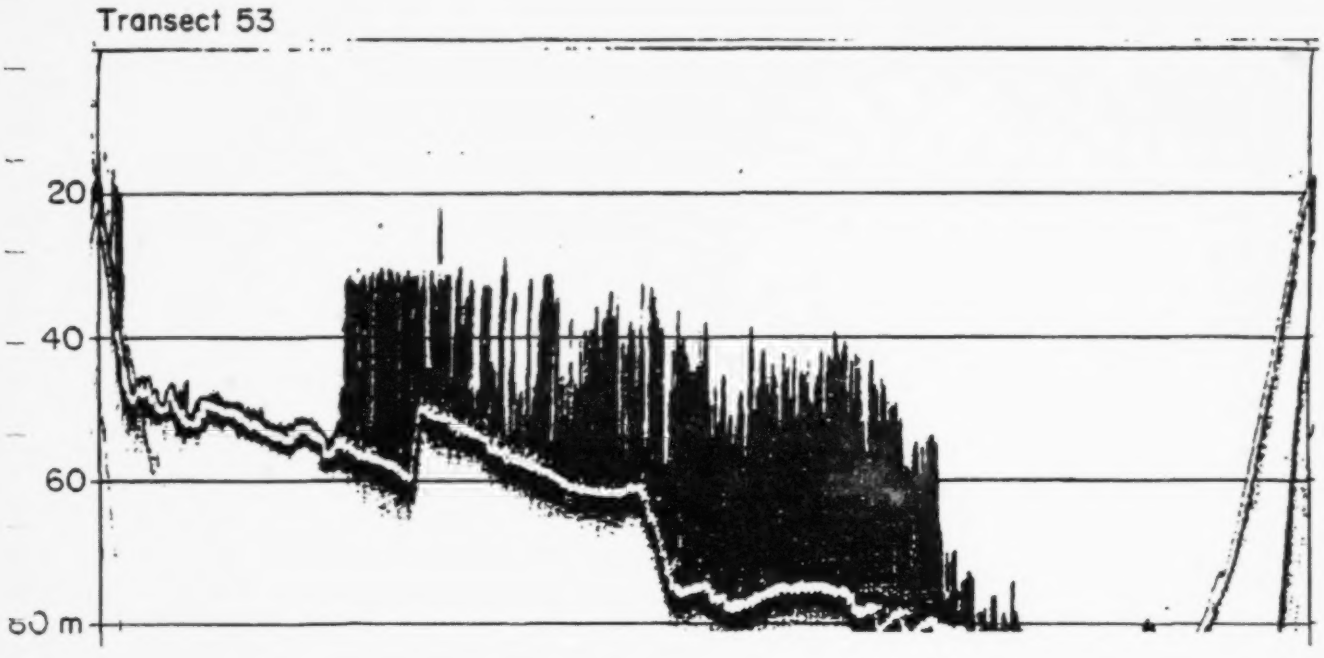
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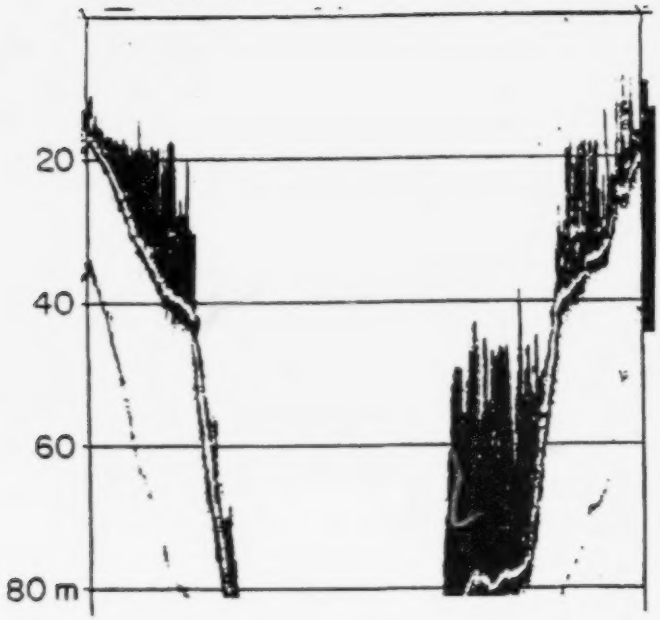
Transect 54



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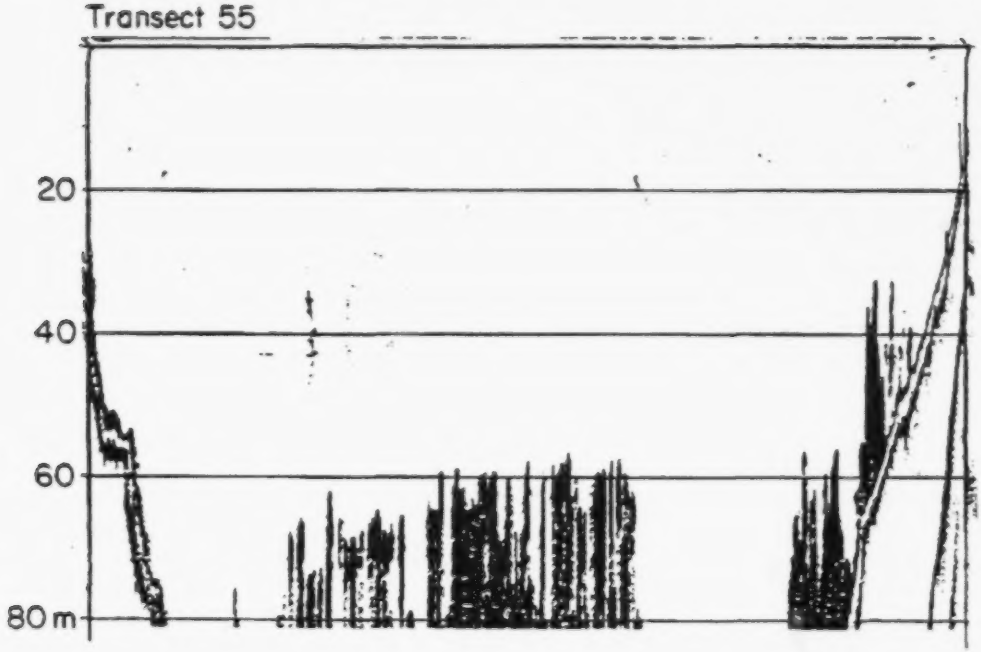

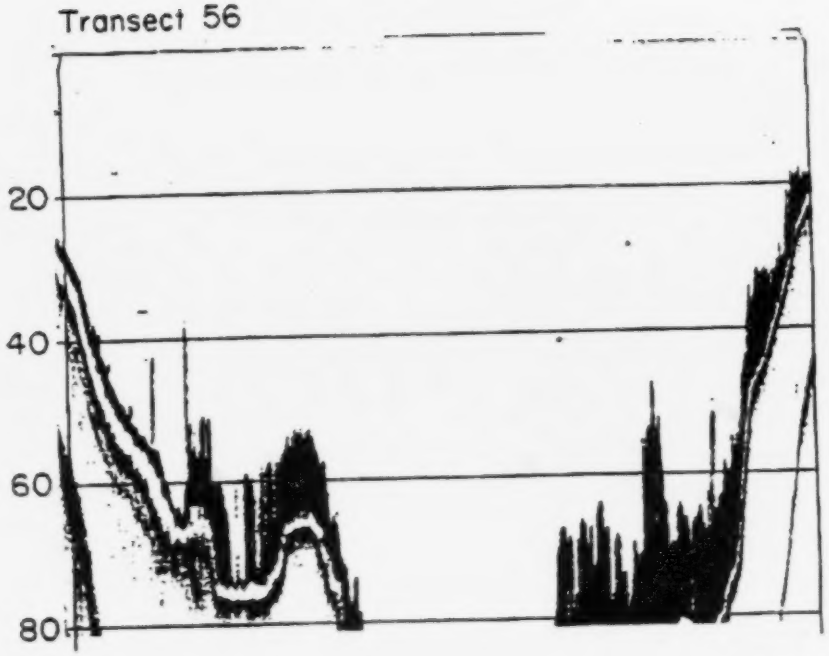
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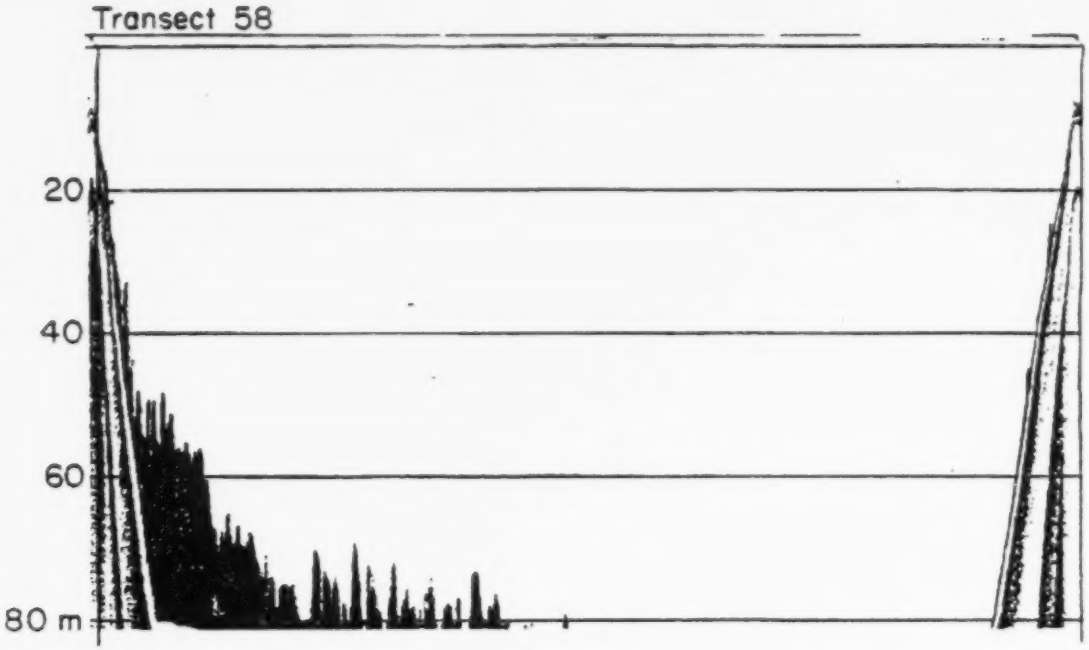
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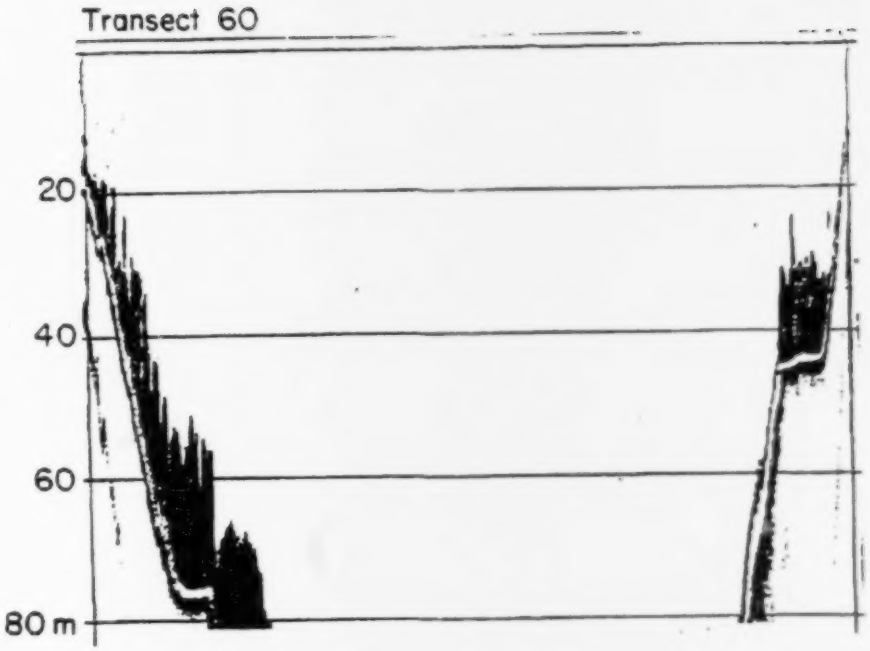
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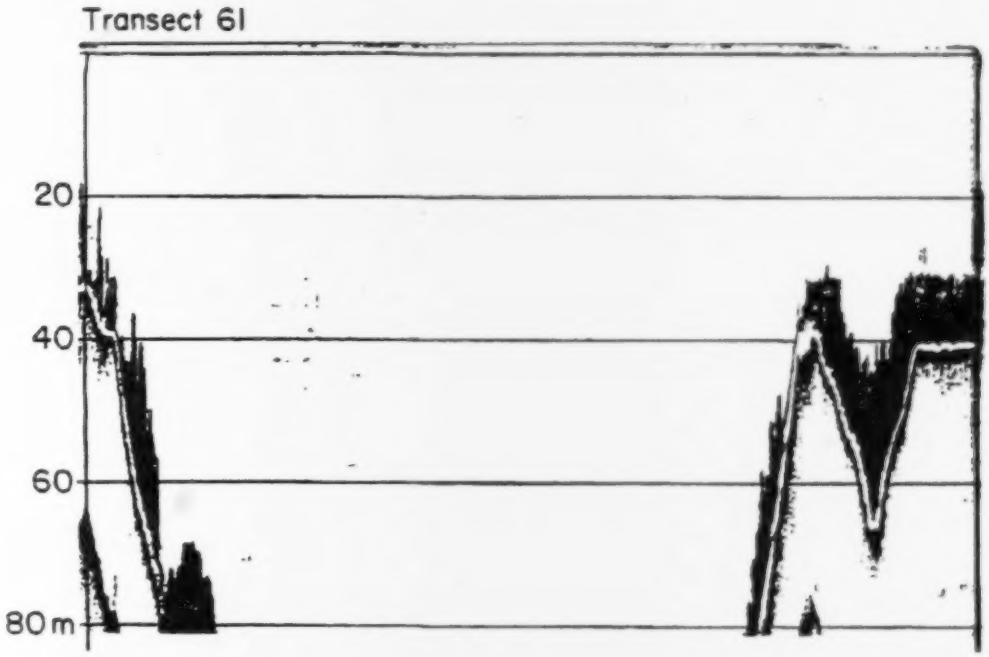
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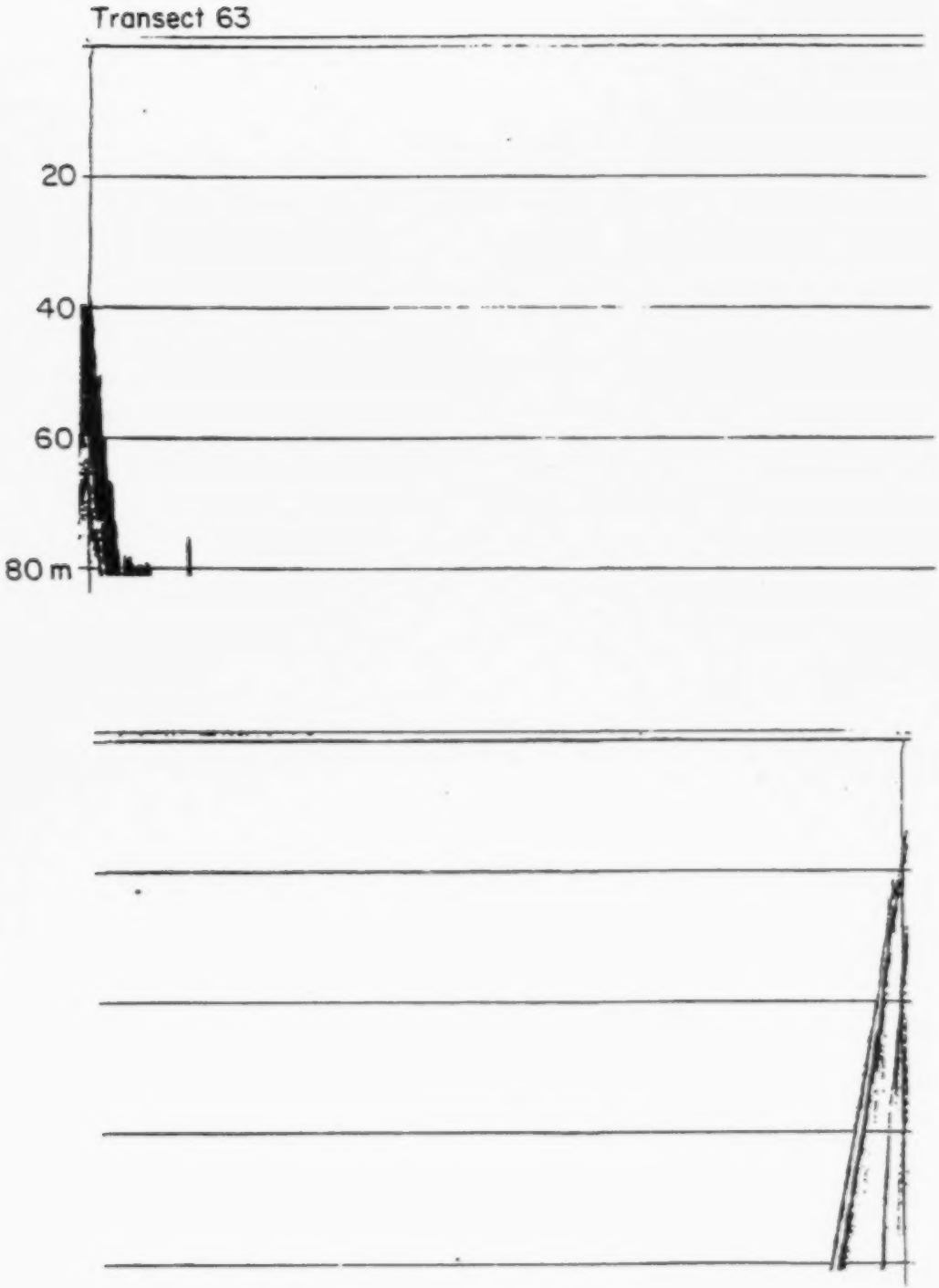
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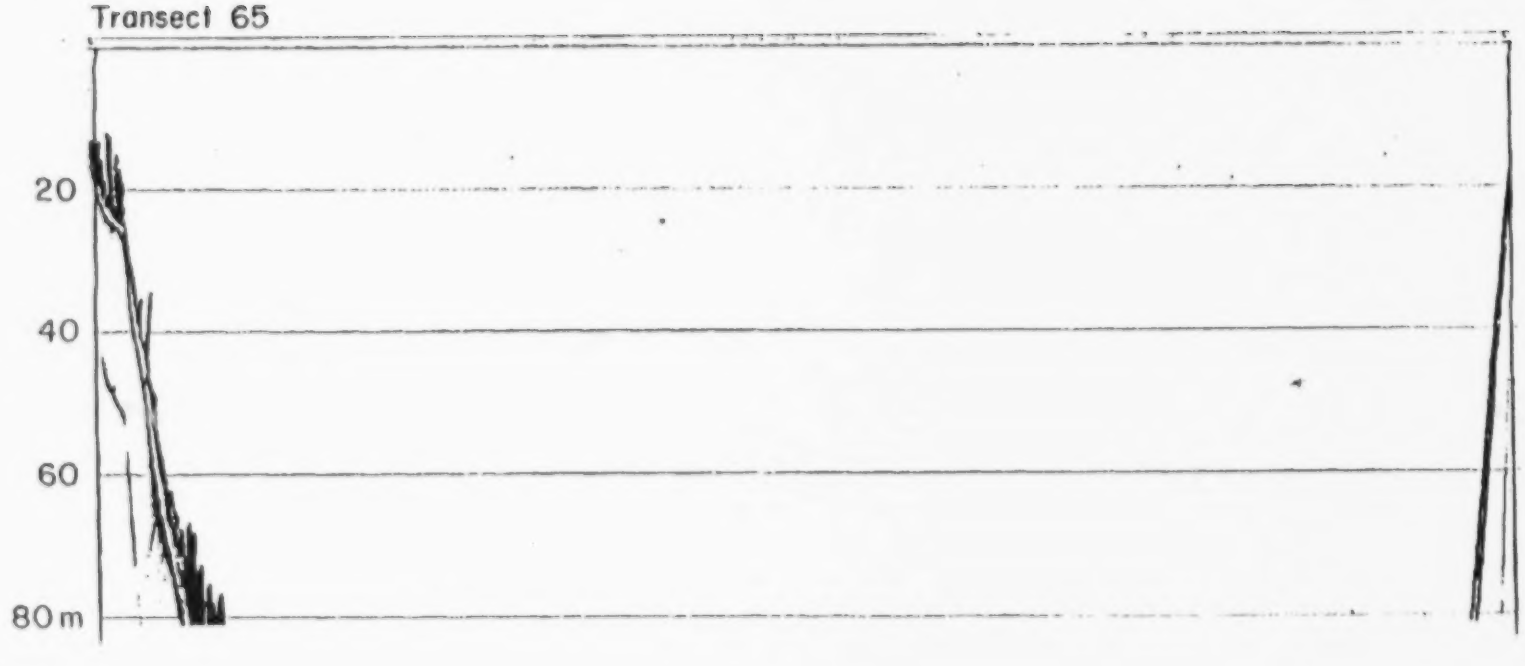
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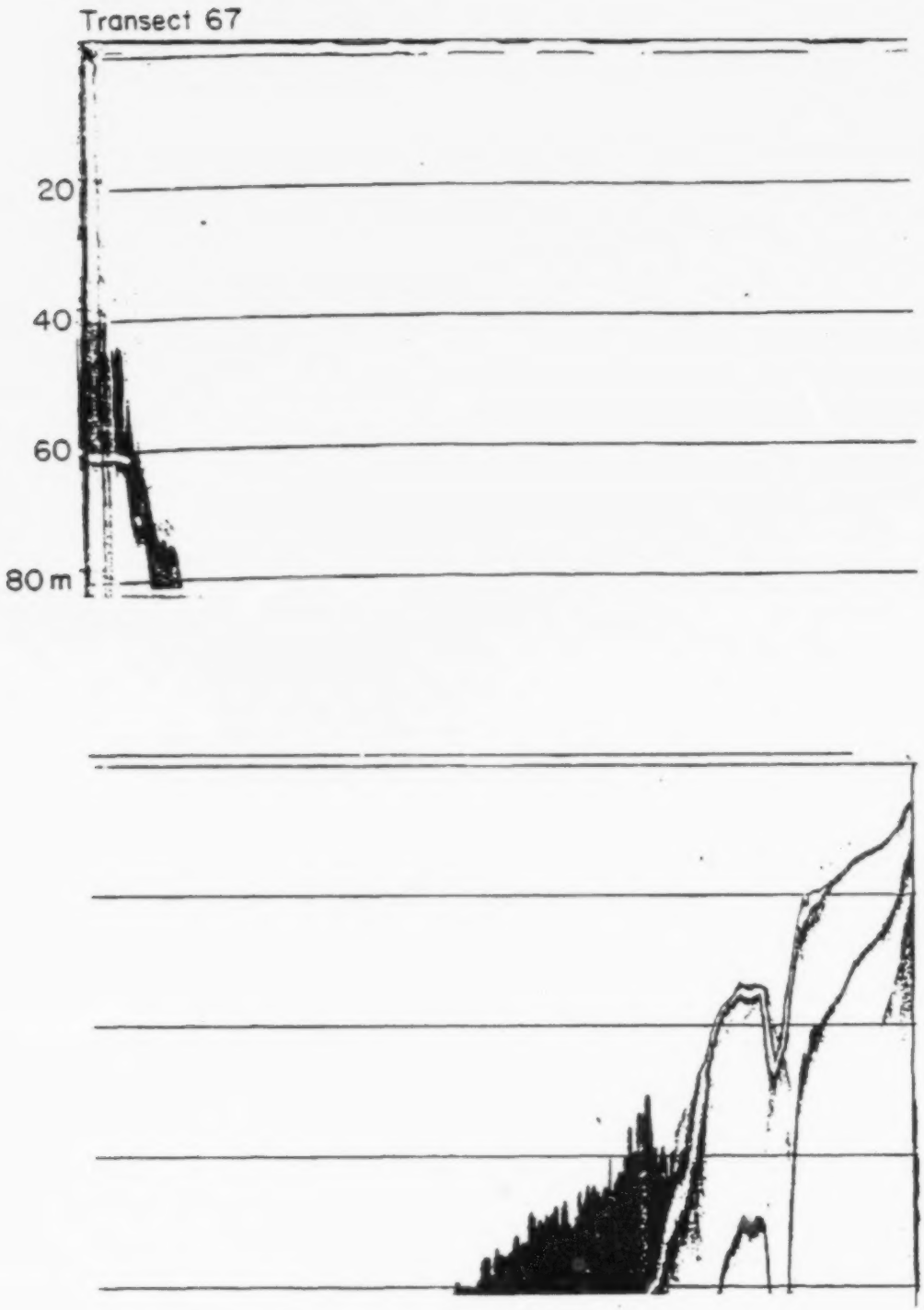
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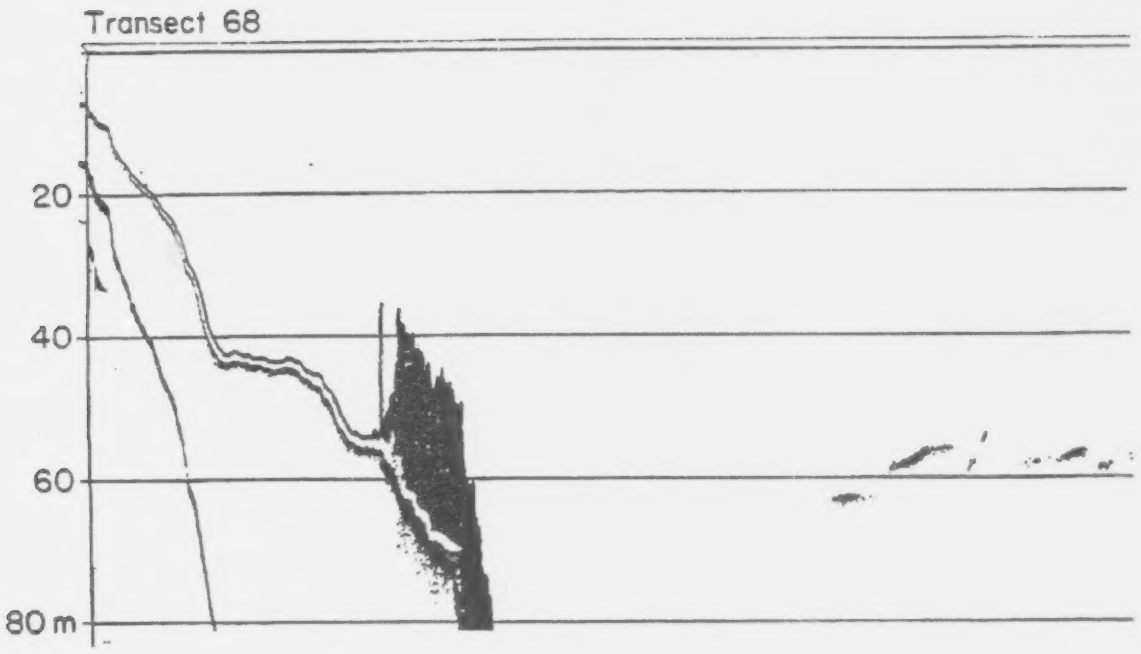
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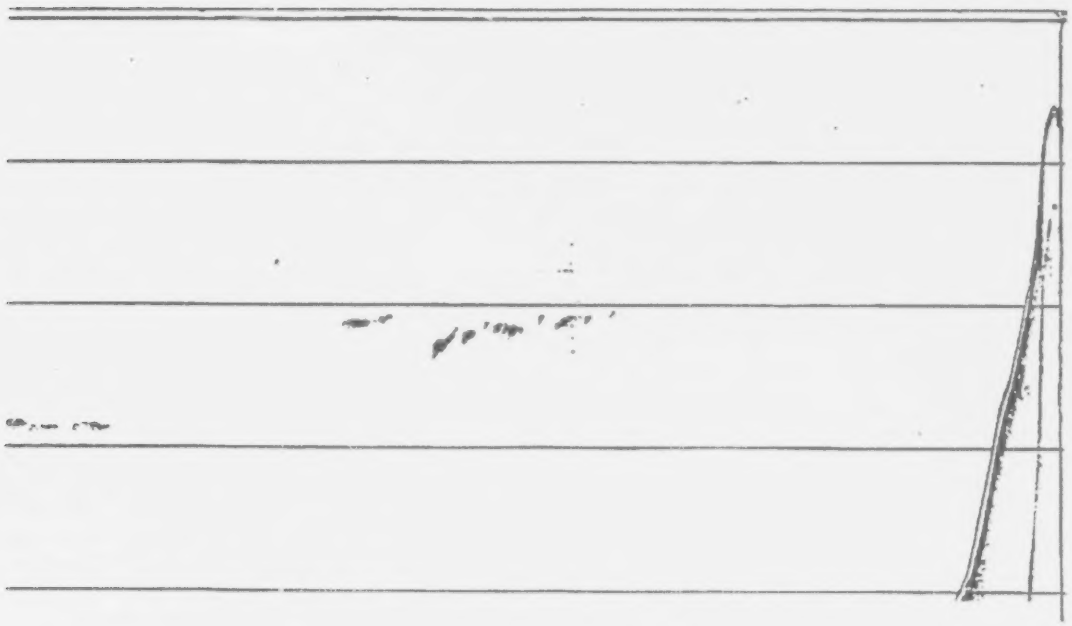

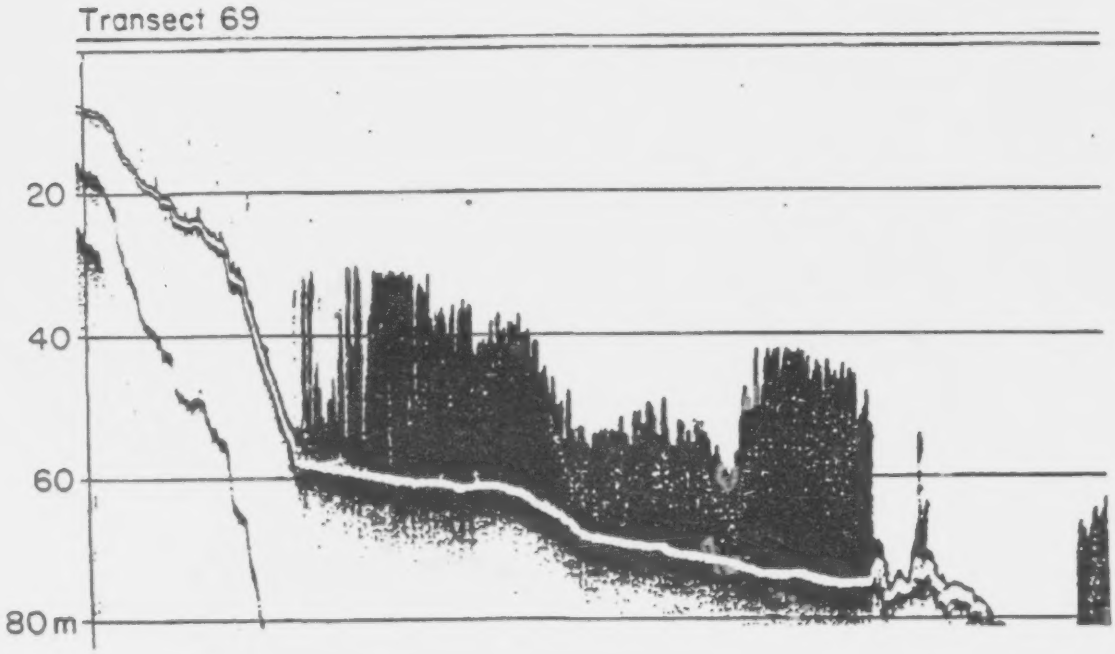
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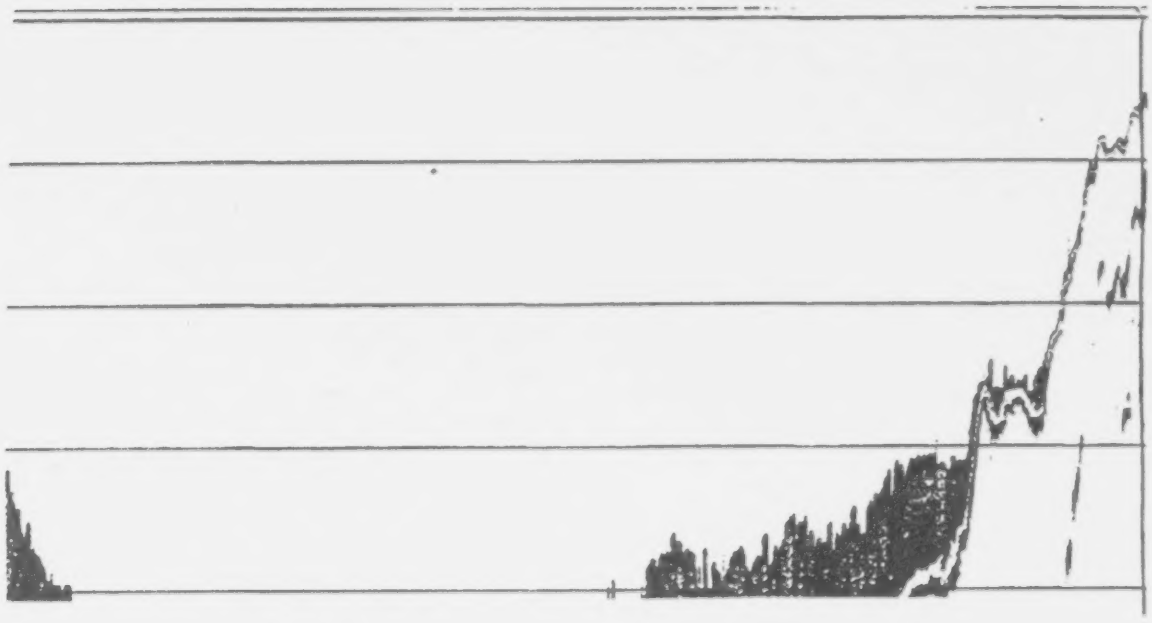

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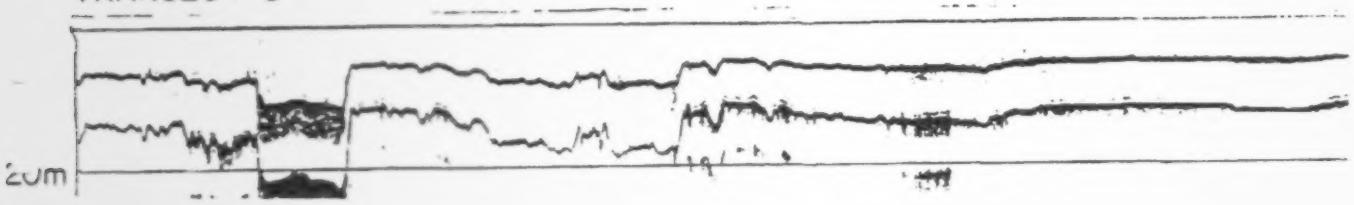
TRANSECT 3



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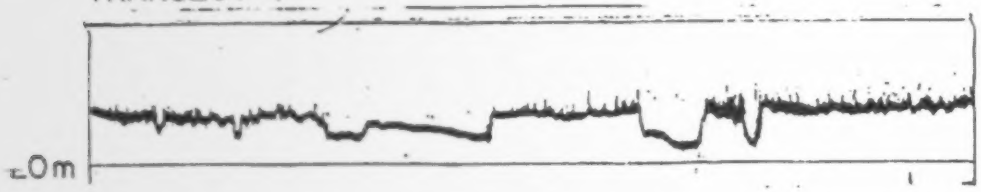

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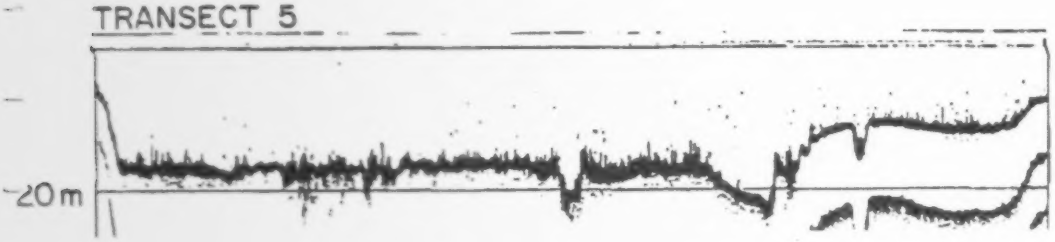

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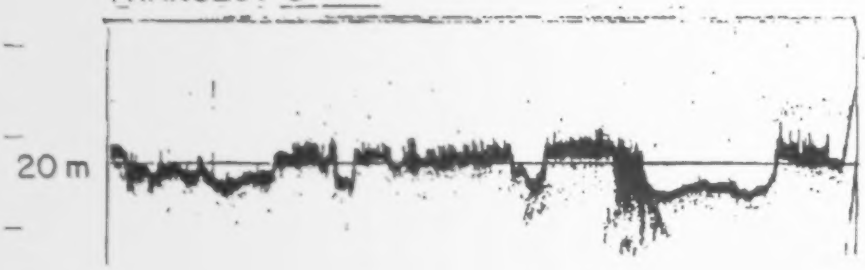

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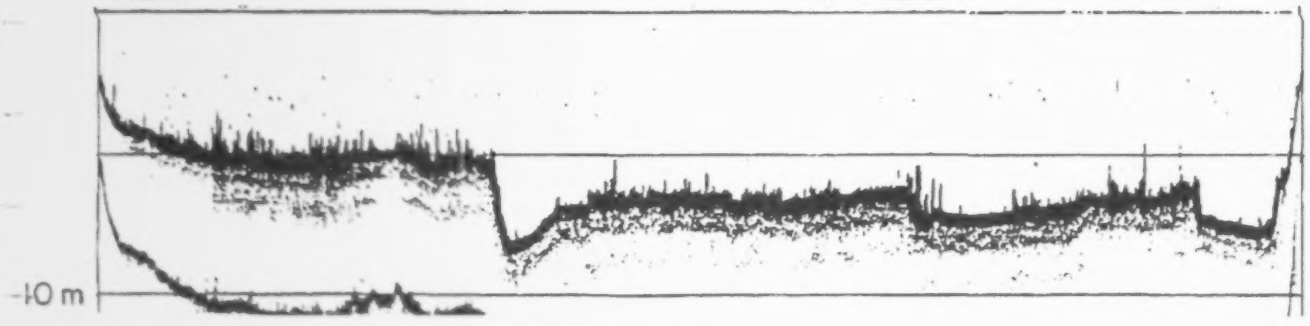

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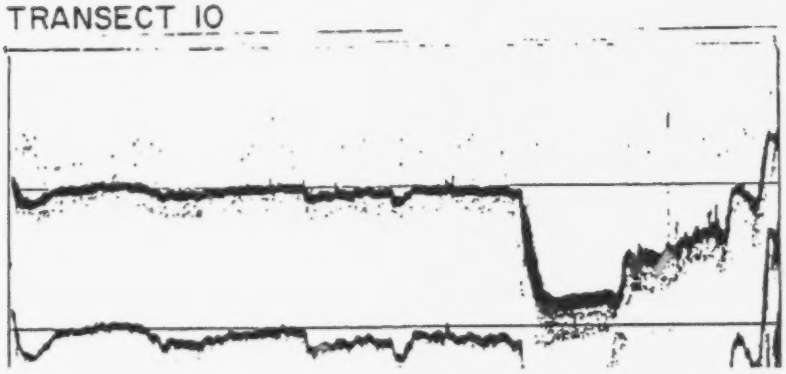
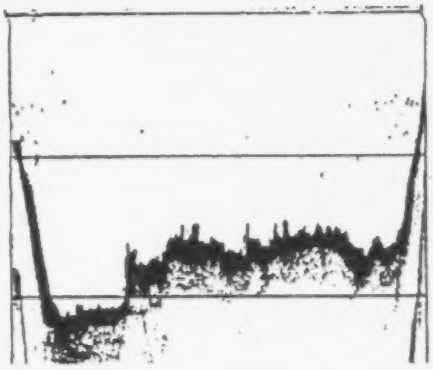


TRANSECT 11

TRANSECT 12



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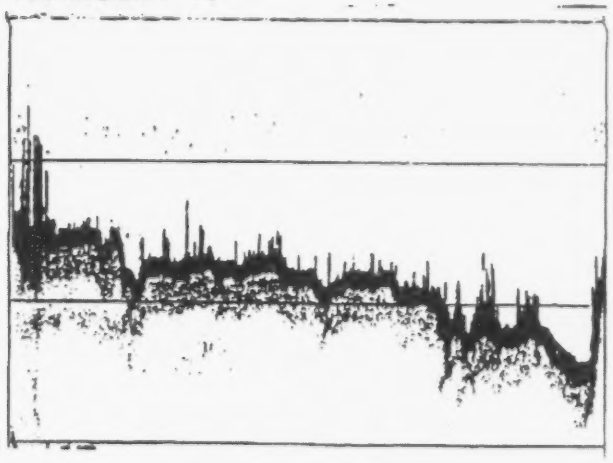

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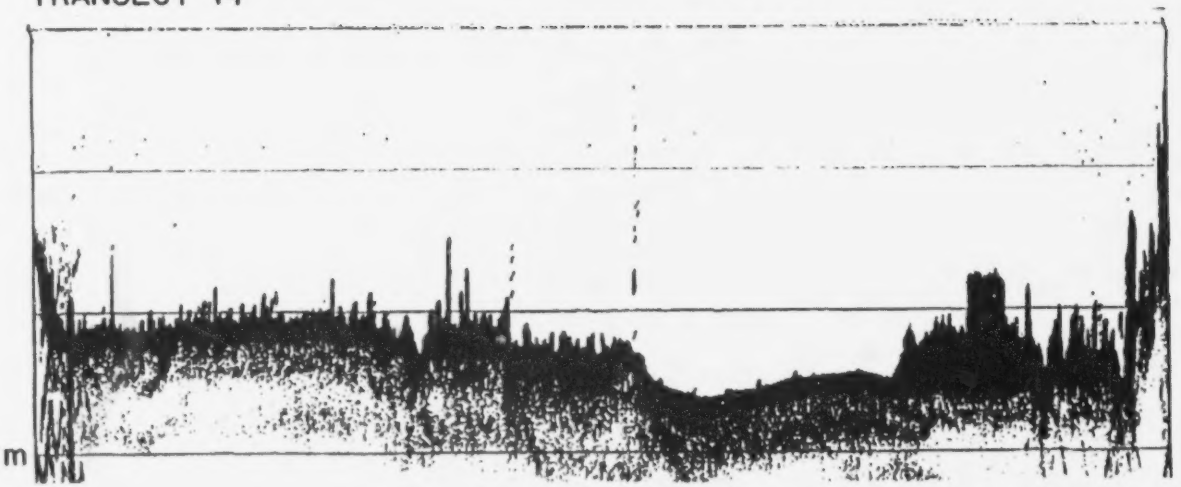

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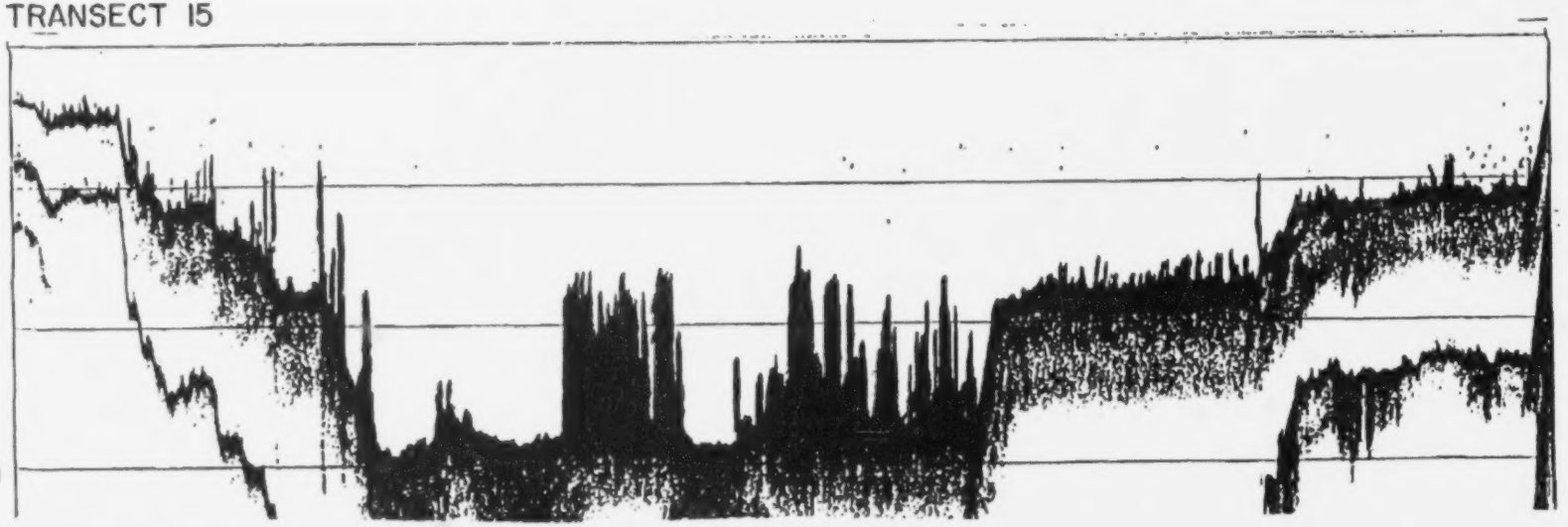

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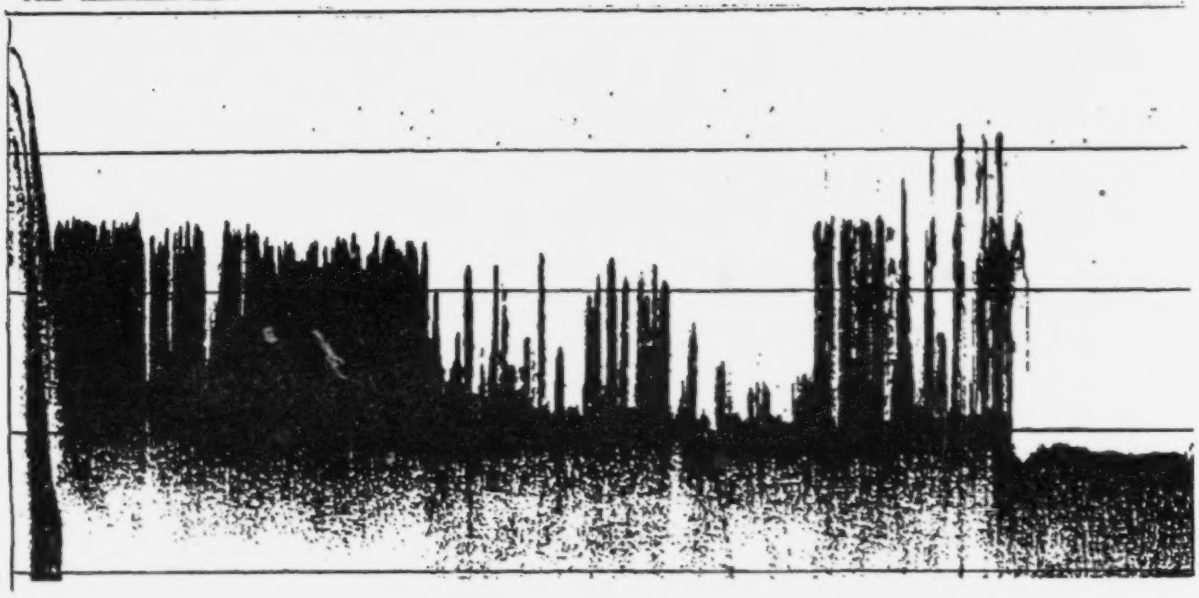

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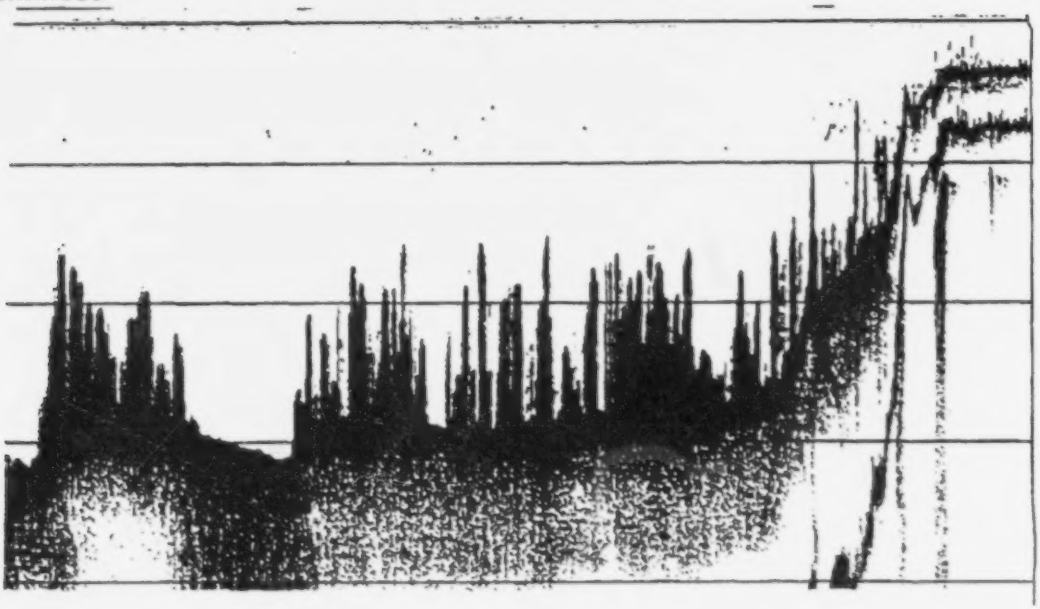

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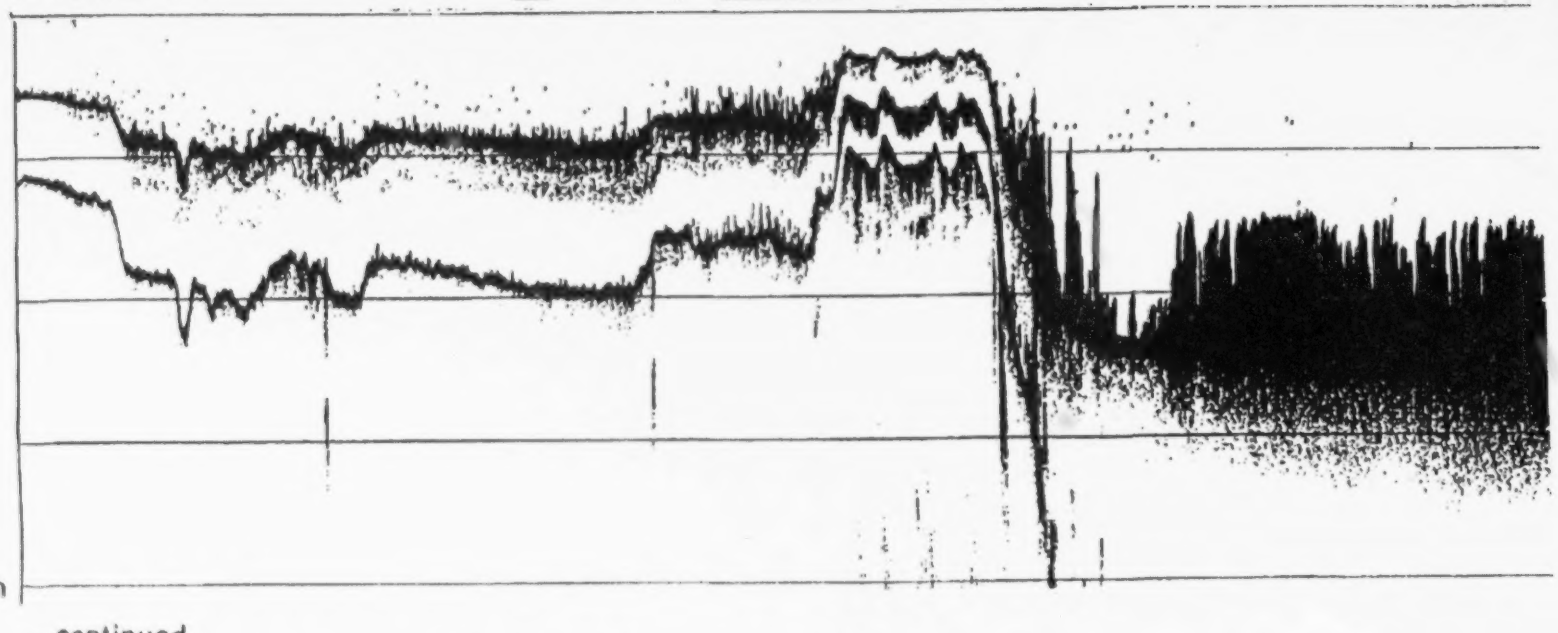

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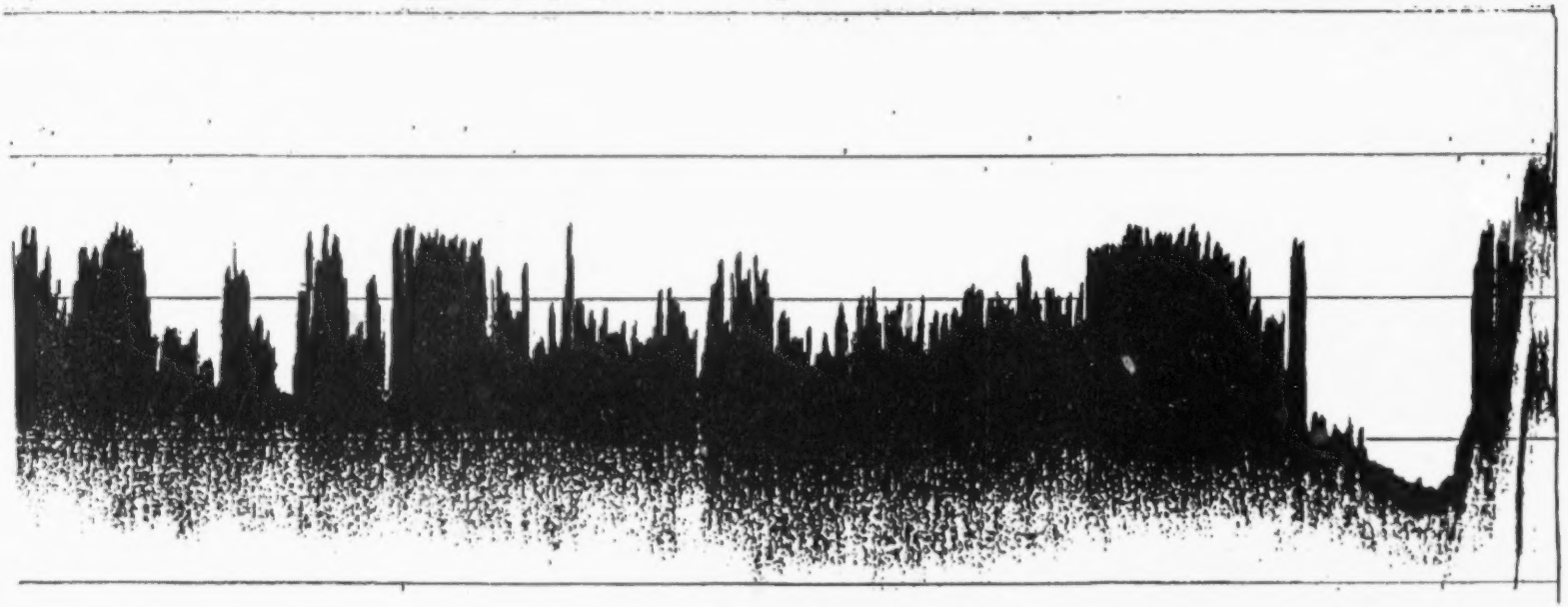

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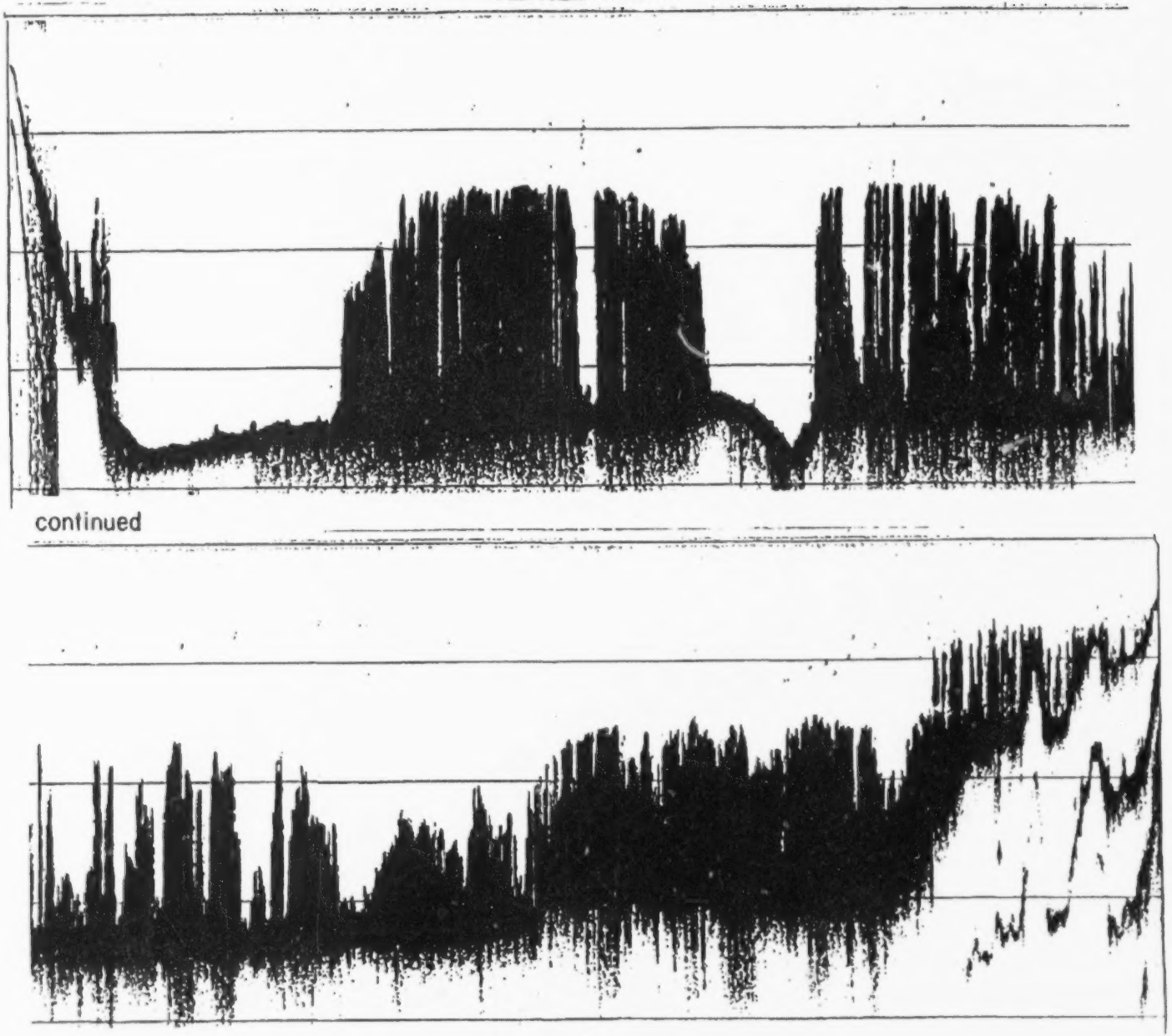

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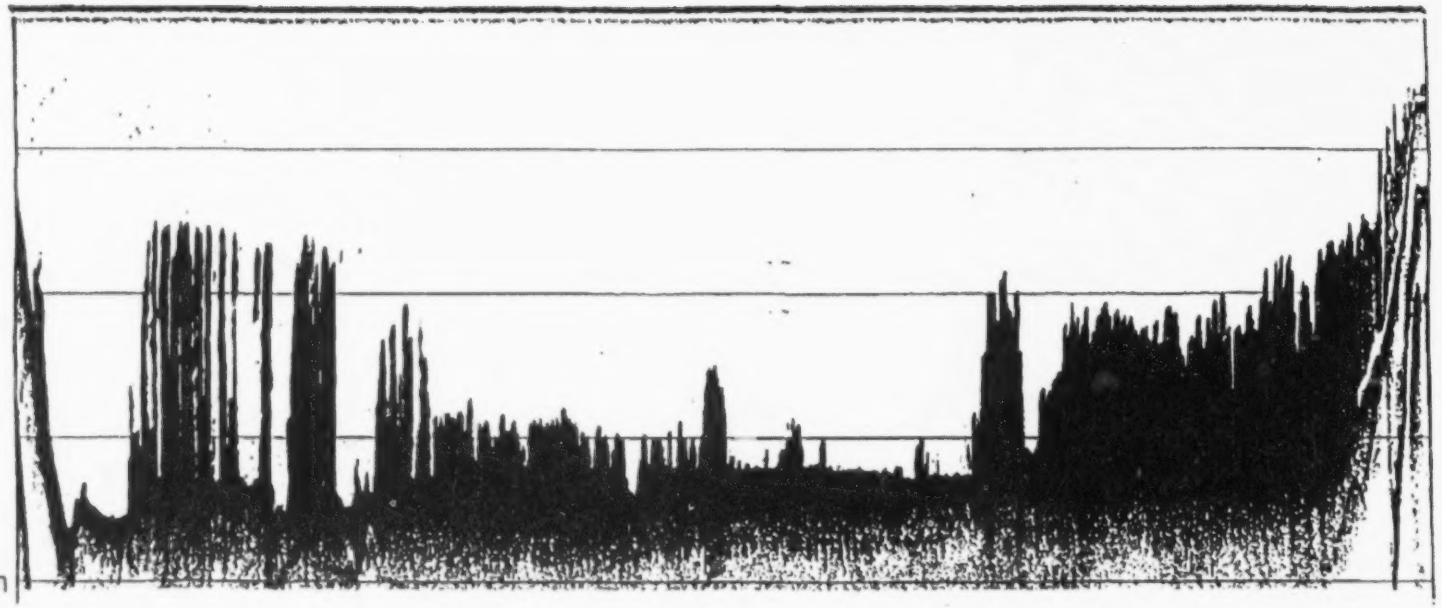

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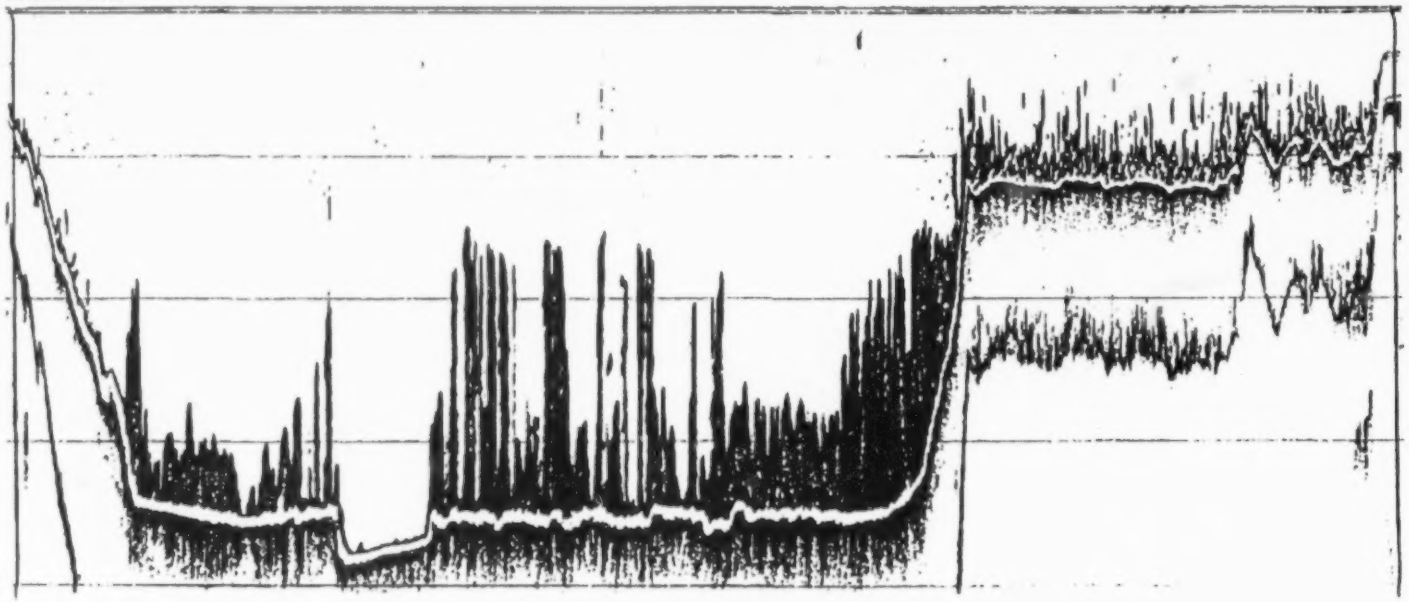

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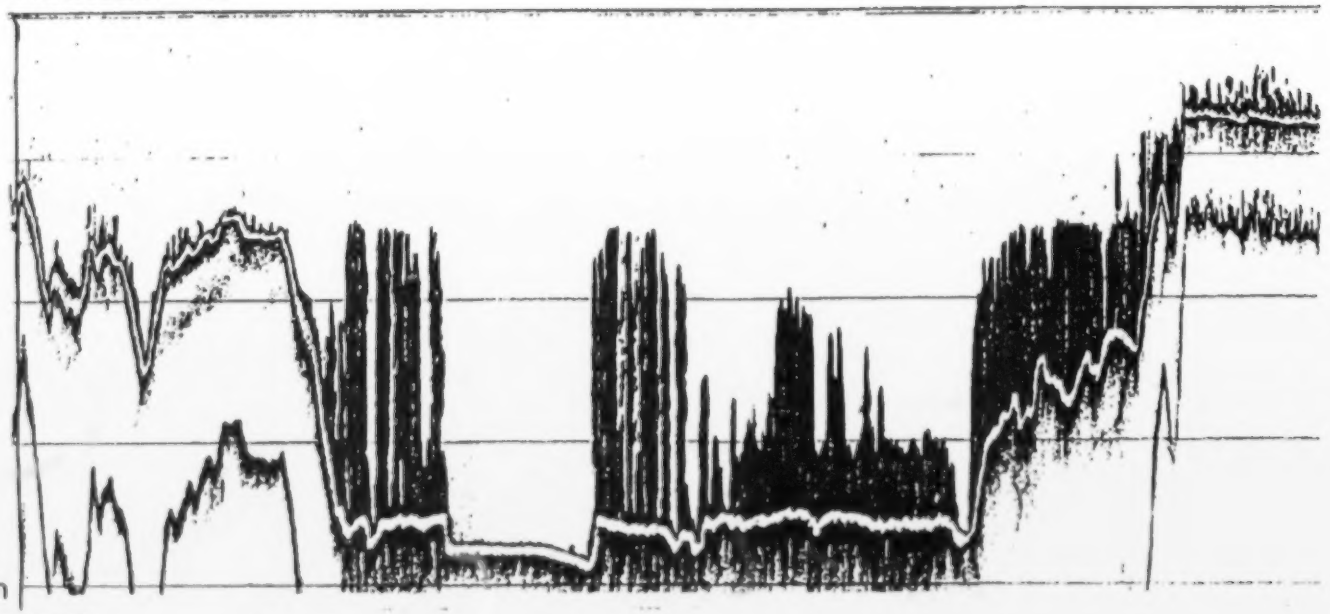

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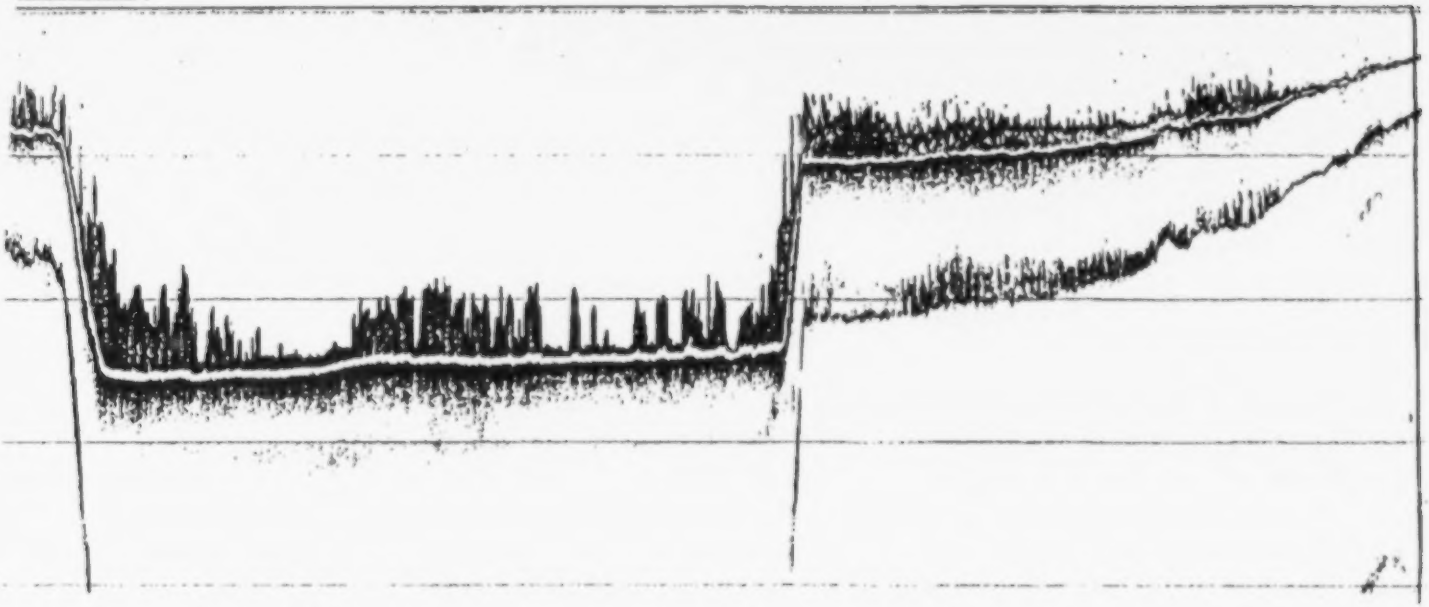

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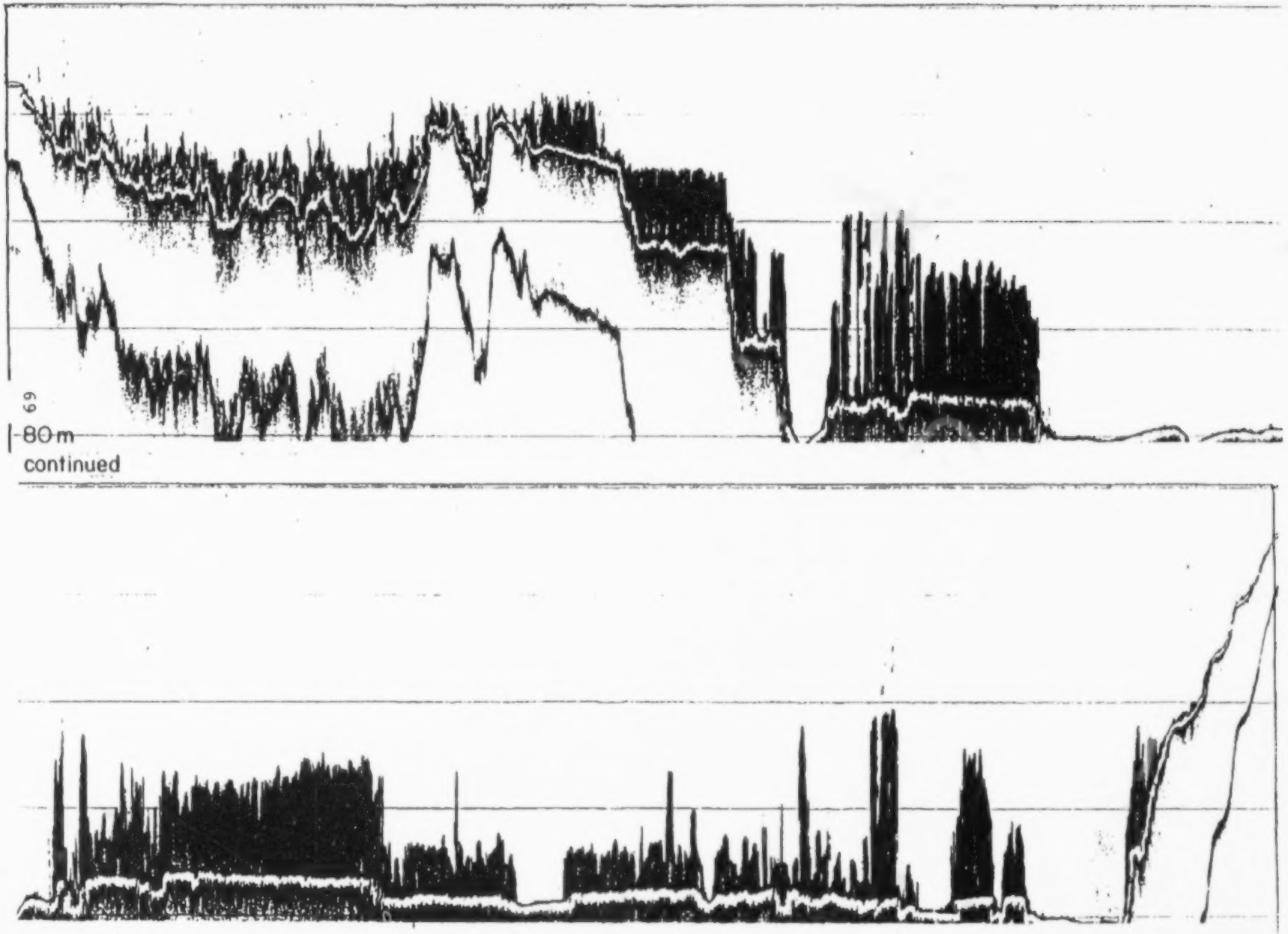

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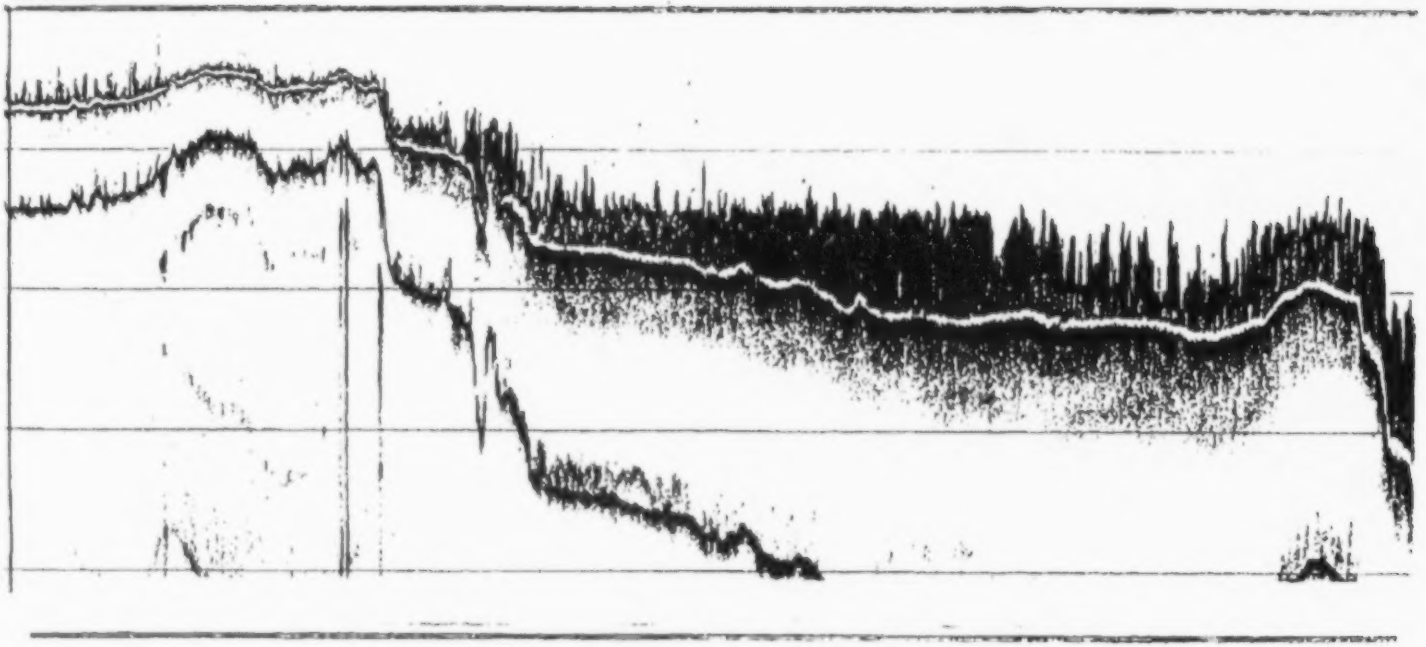

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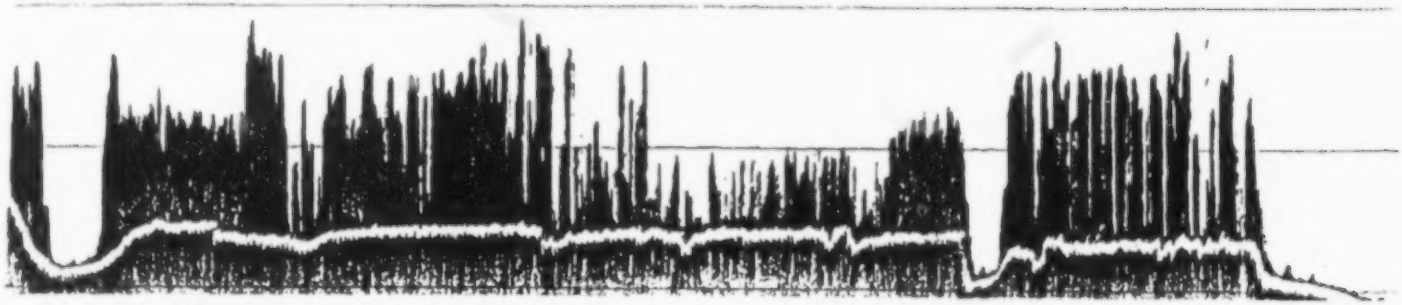

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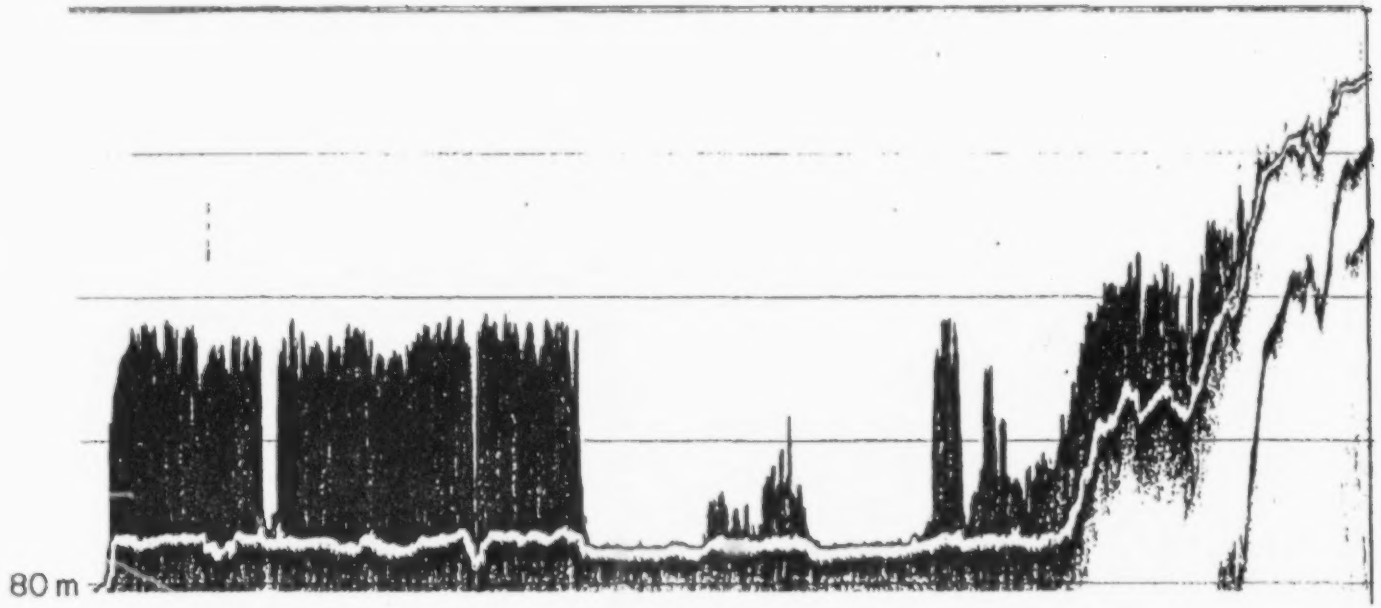

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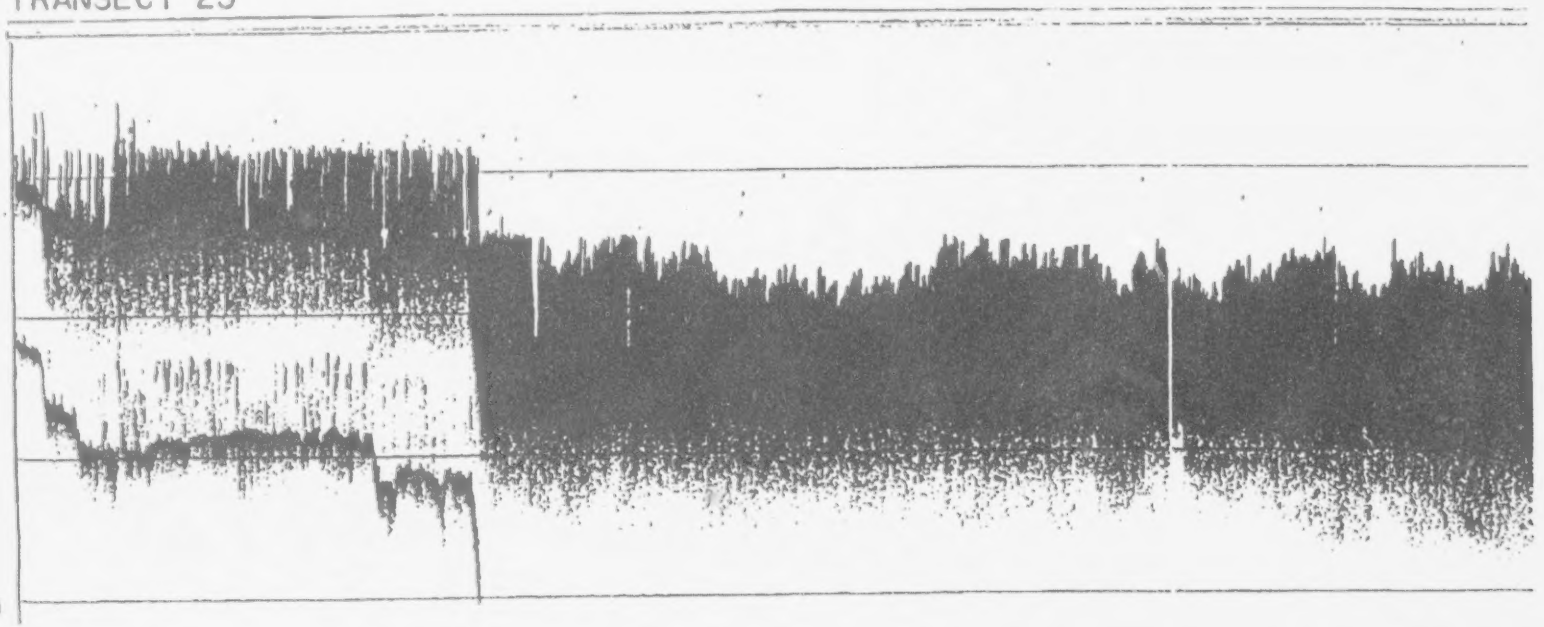

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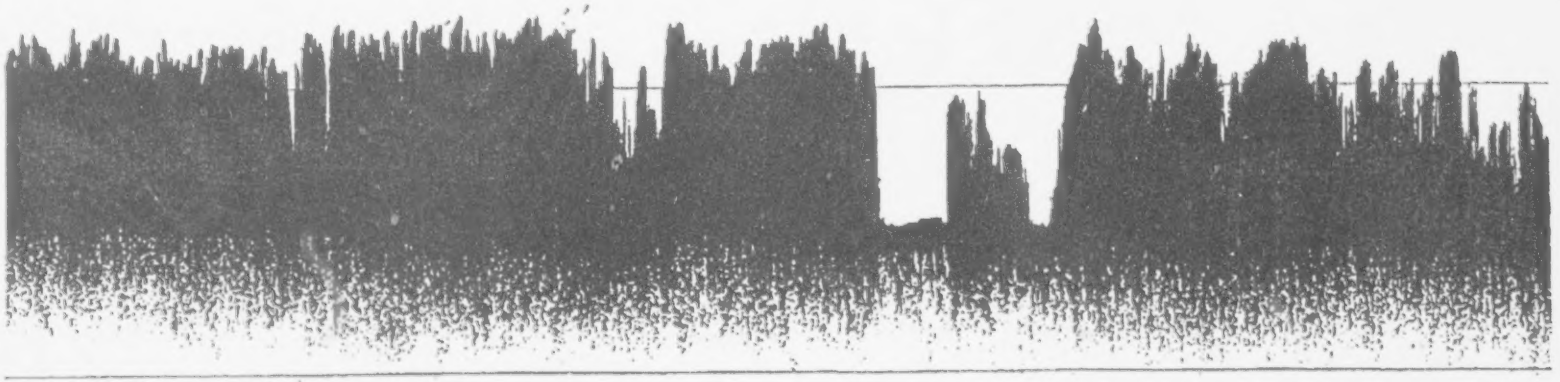

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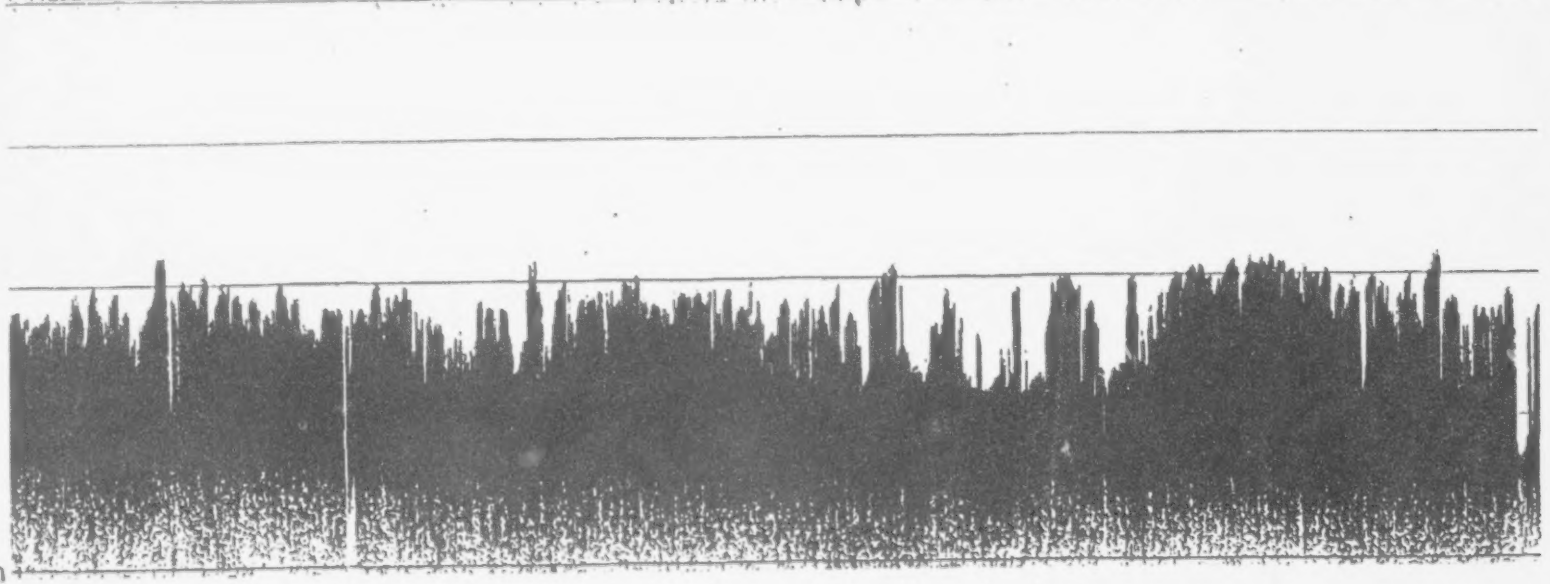

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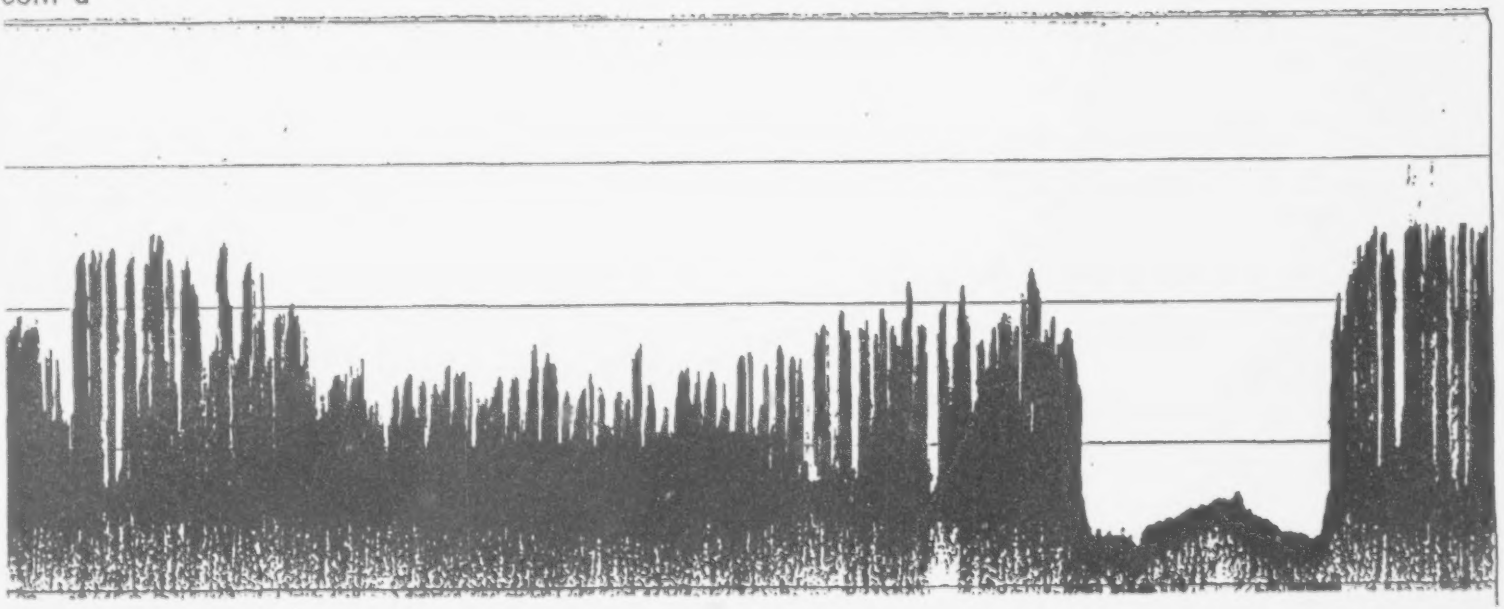

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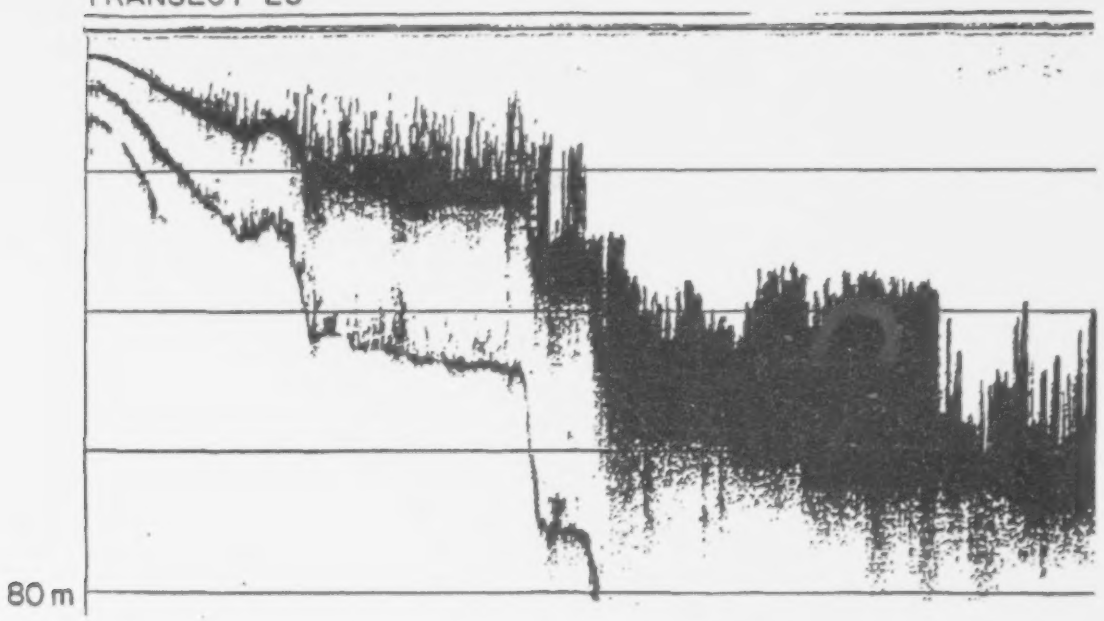

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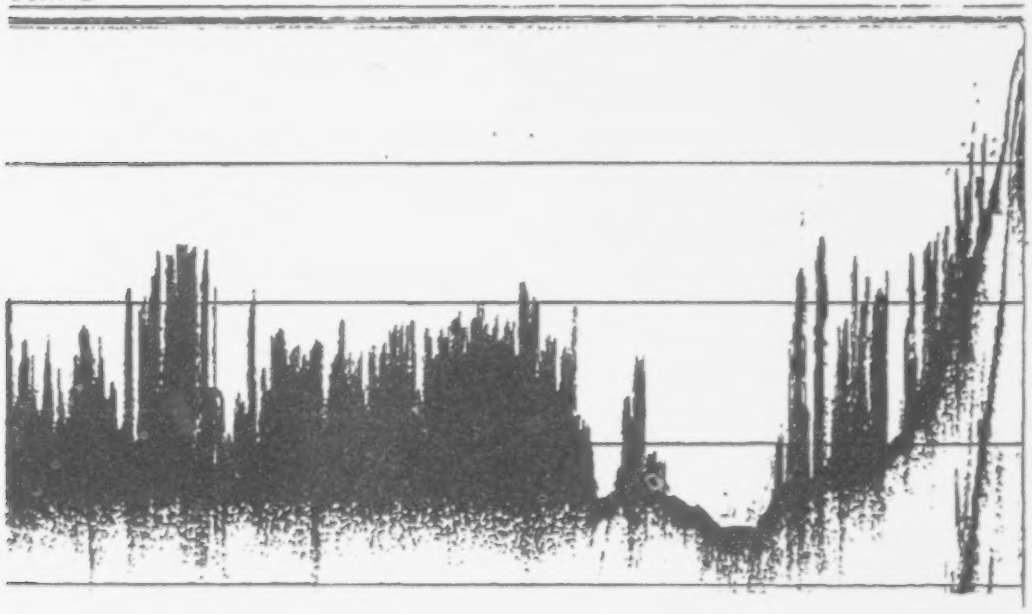

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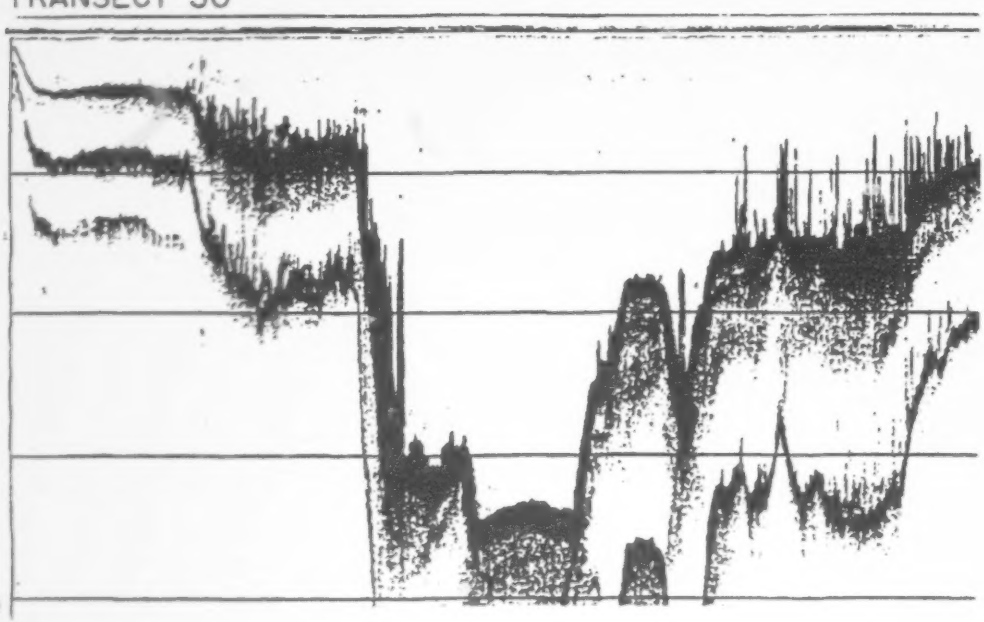

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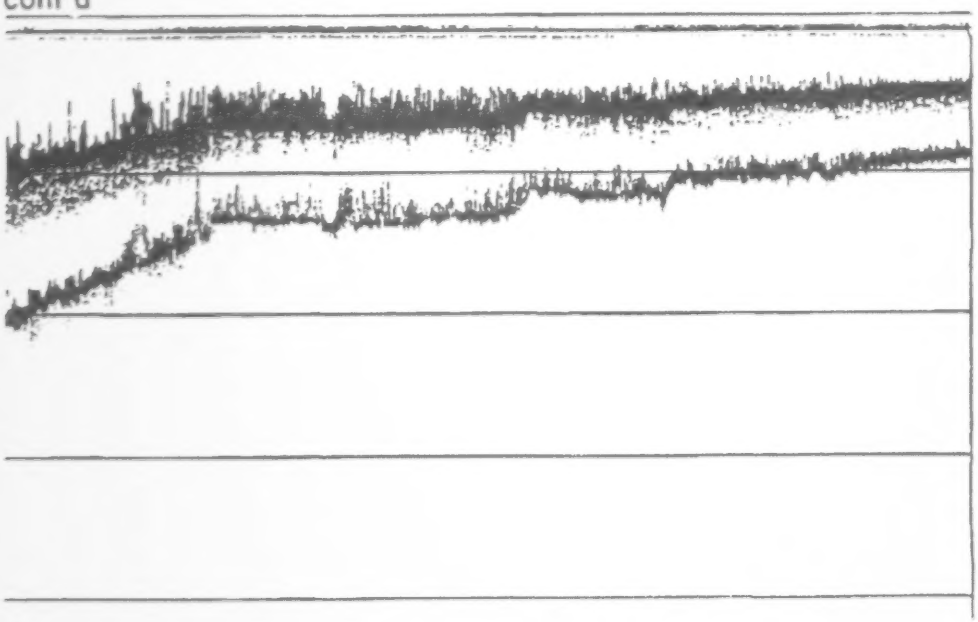

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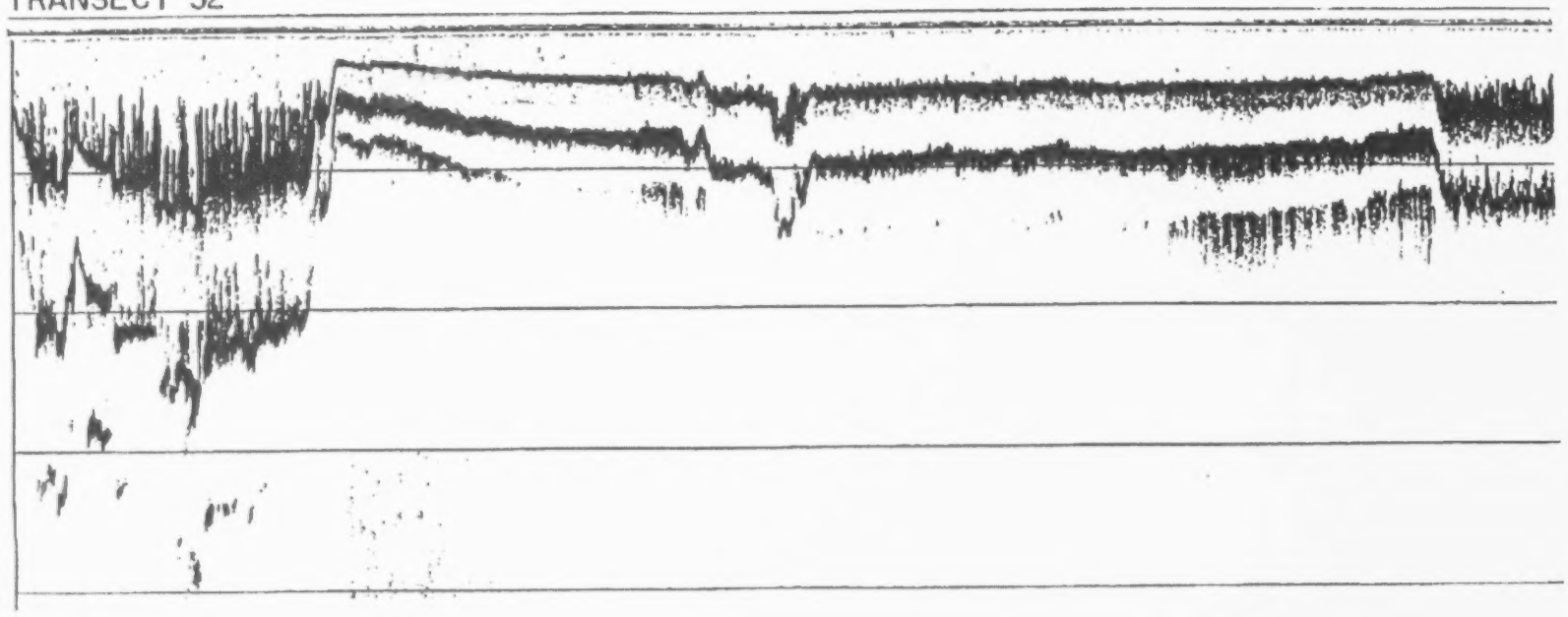

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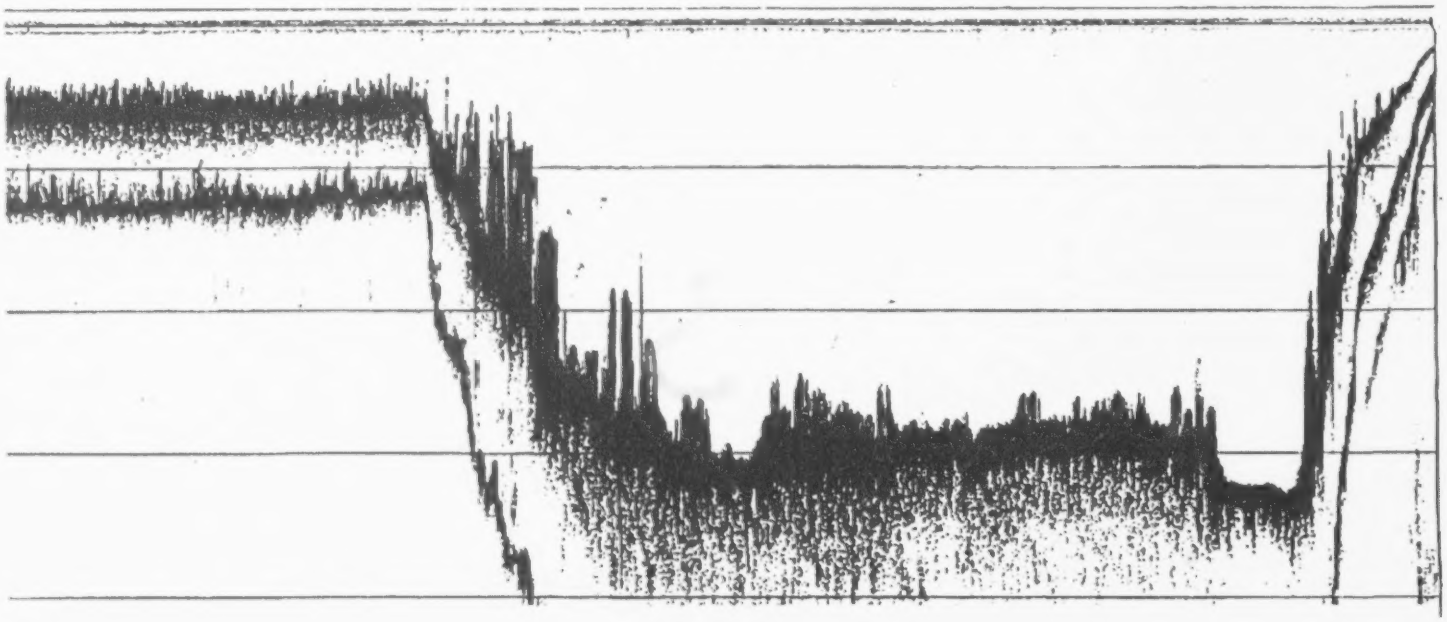

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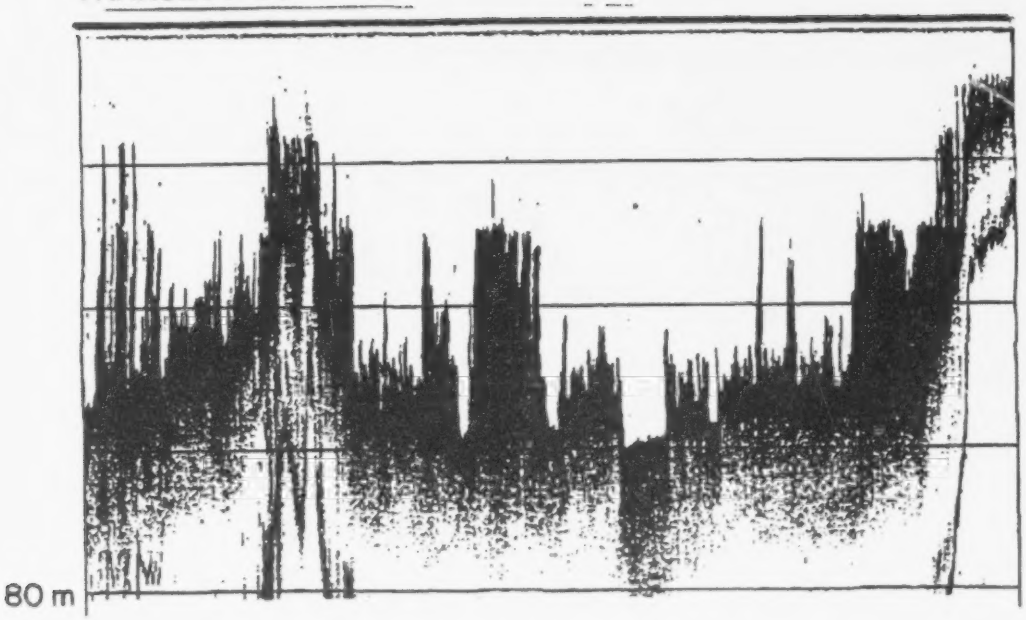

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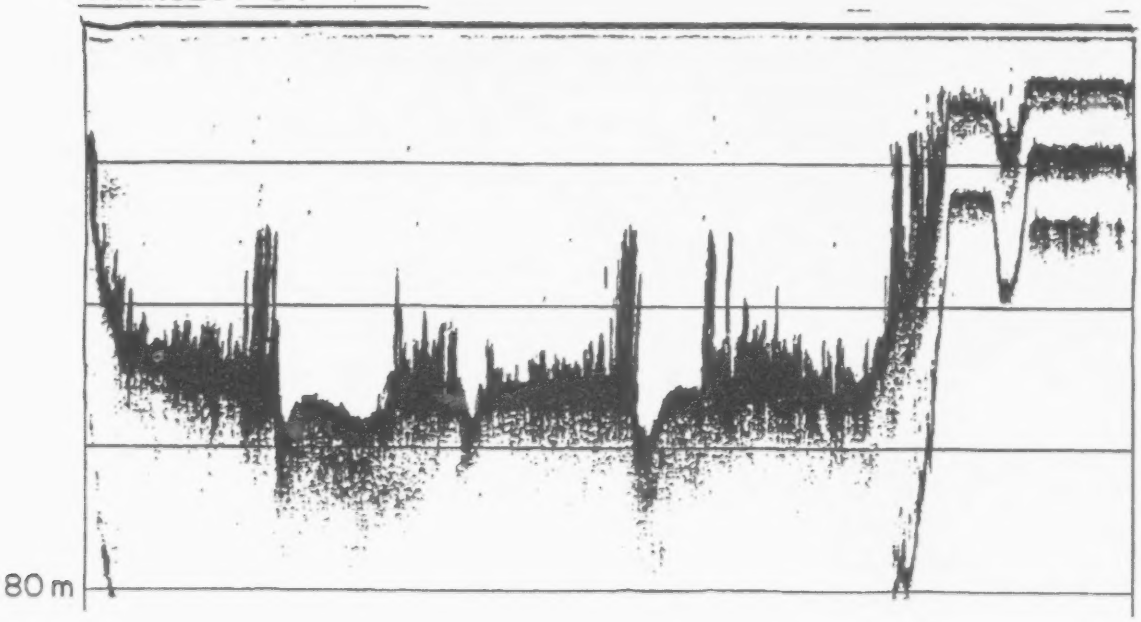

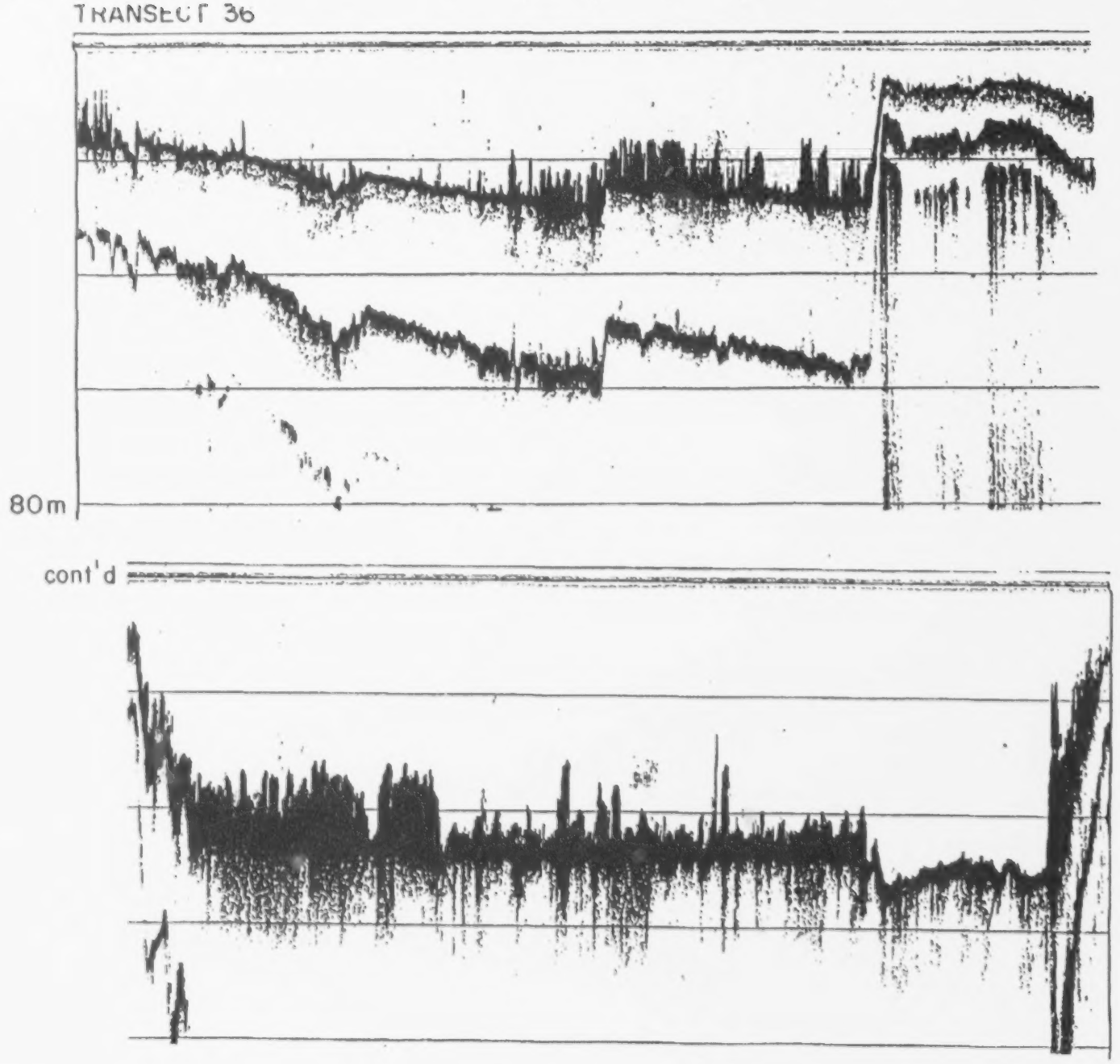
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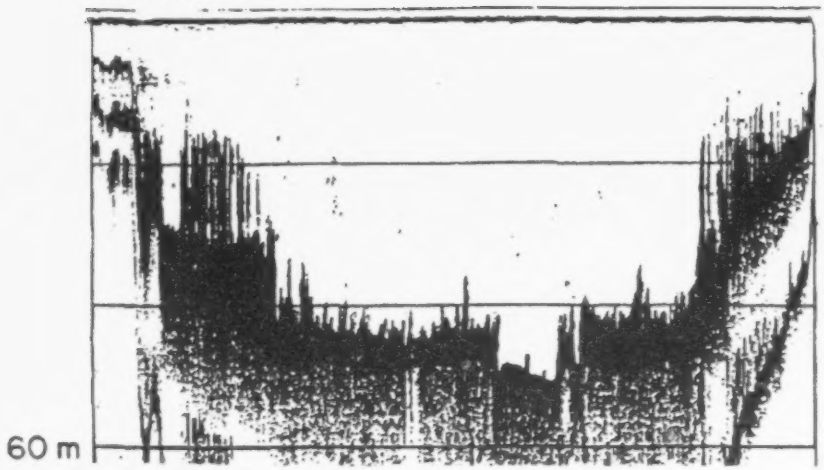
TRANSECT 37



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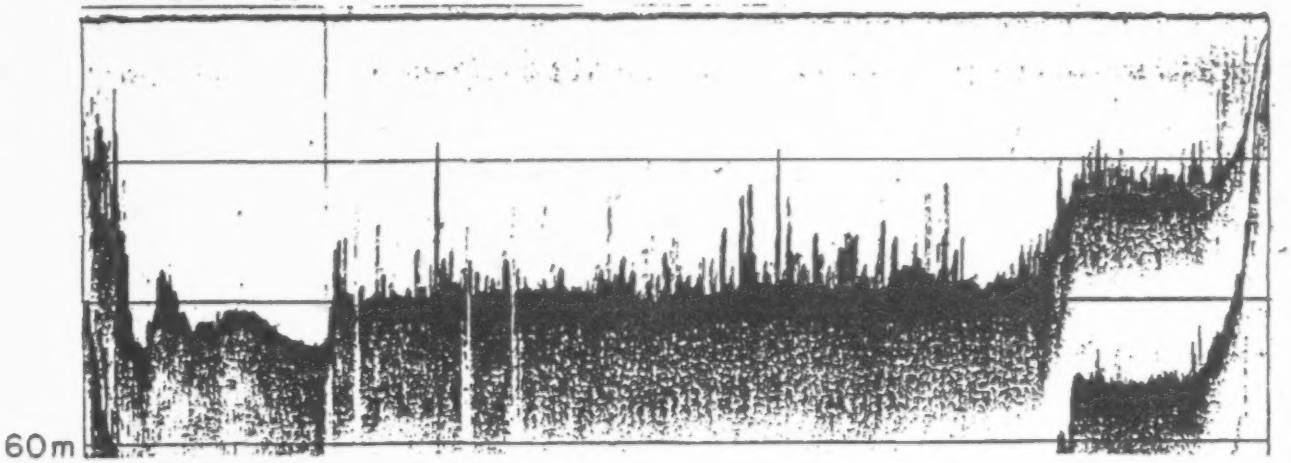
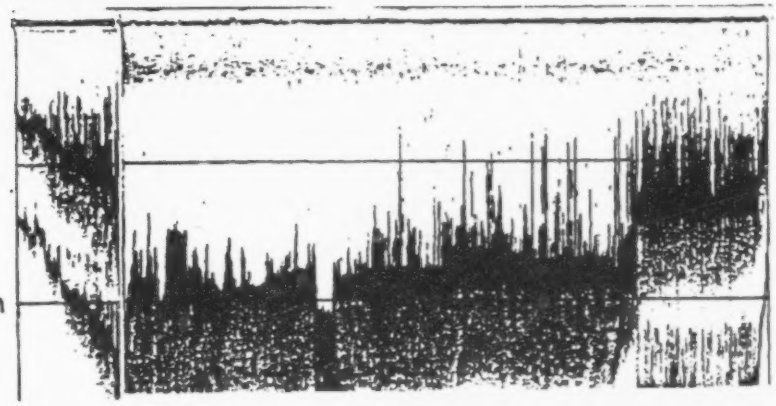
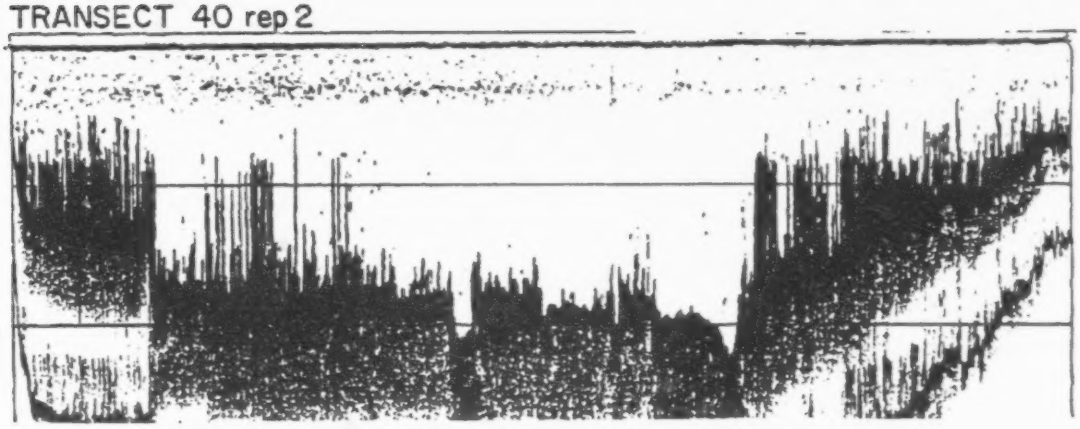


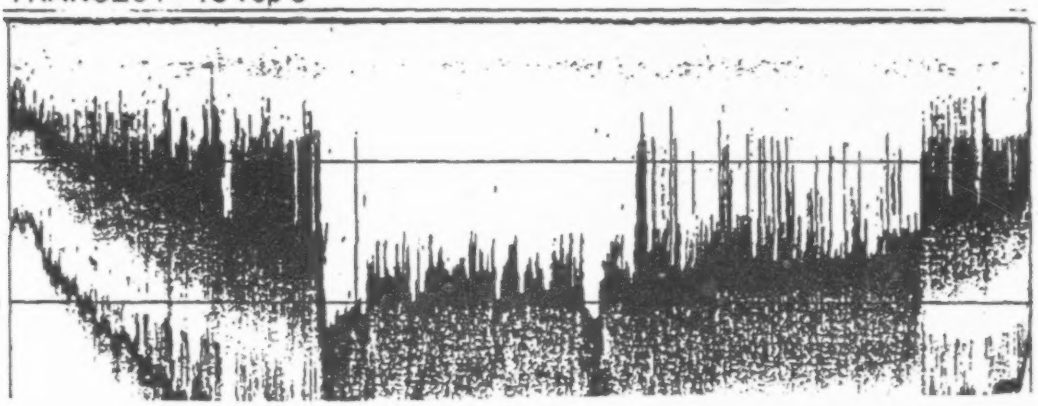
TRANSECT 40 rep 1



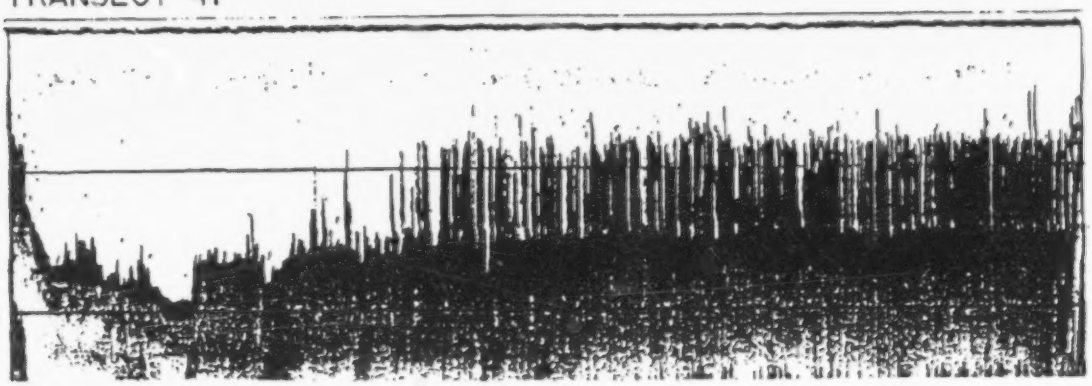
TRANSECT 40 rep 2



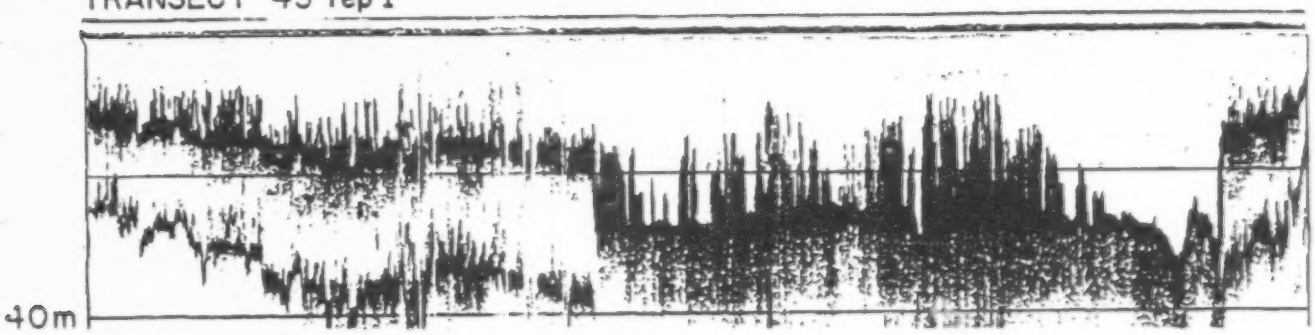
TRANSECT 40 rep 3



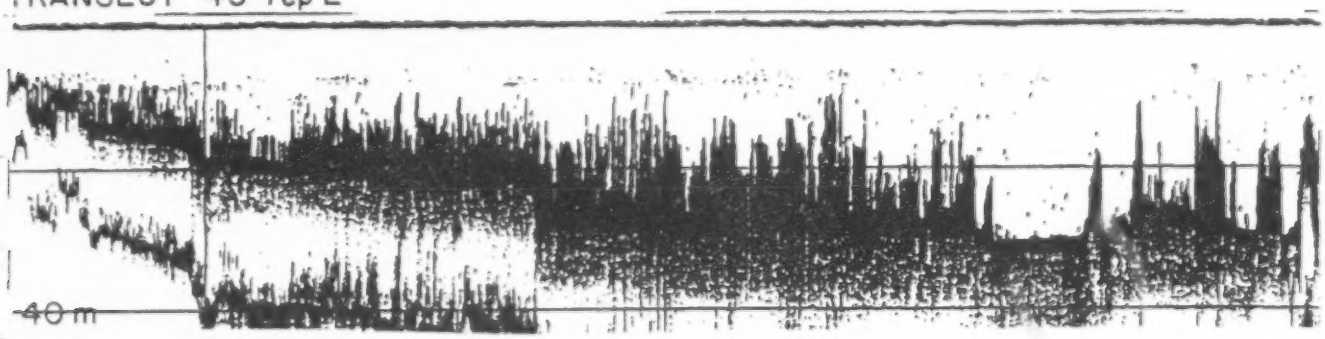
TRANSECT 41

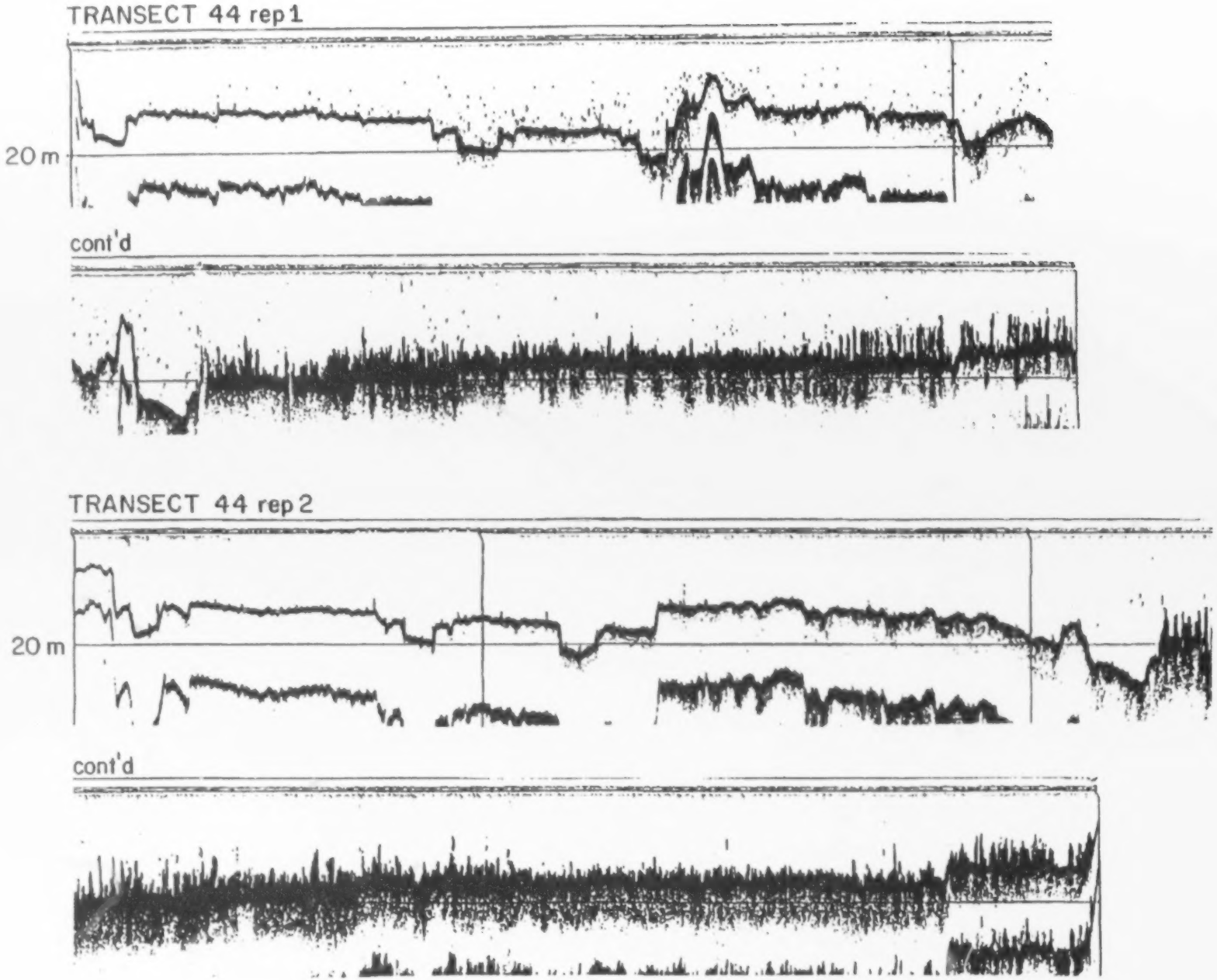


TRANSECT 43 rep 1

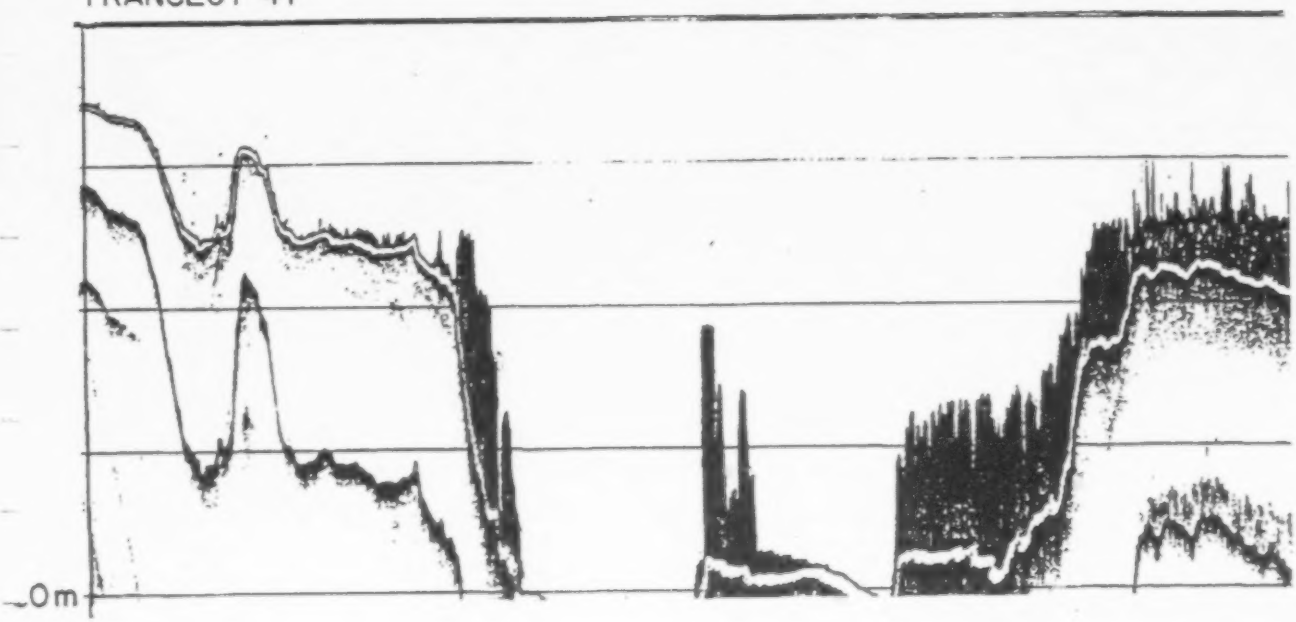


TRANSECT 43 rep 2




TRANSECT 44 rep1
20 m
cont'd
TRANSECT 44 rep2
20 m
cont'd

TRANSECT 47



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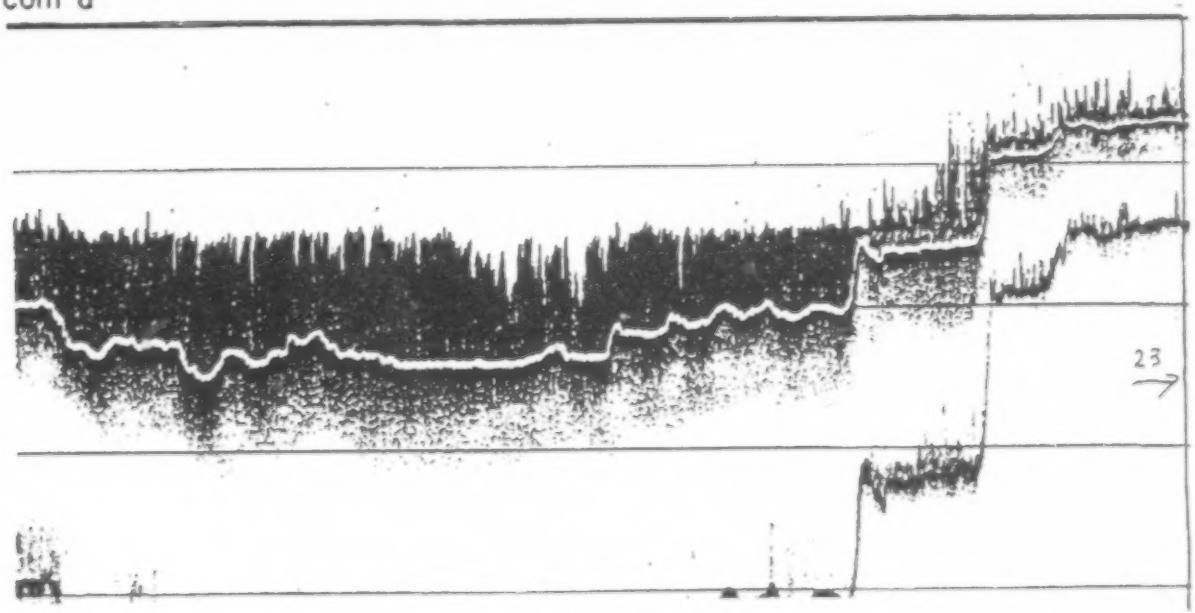
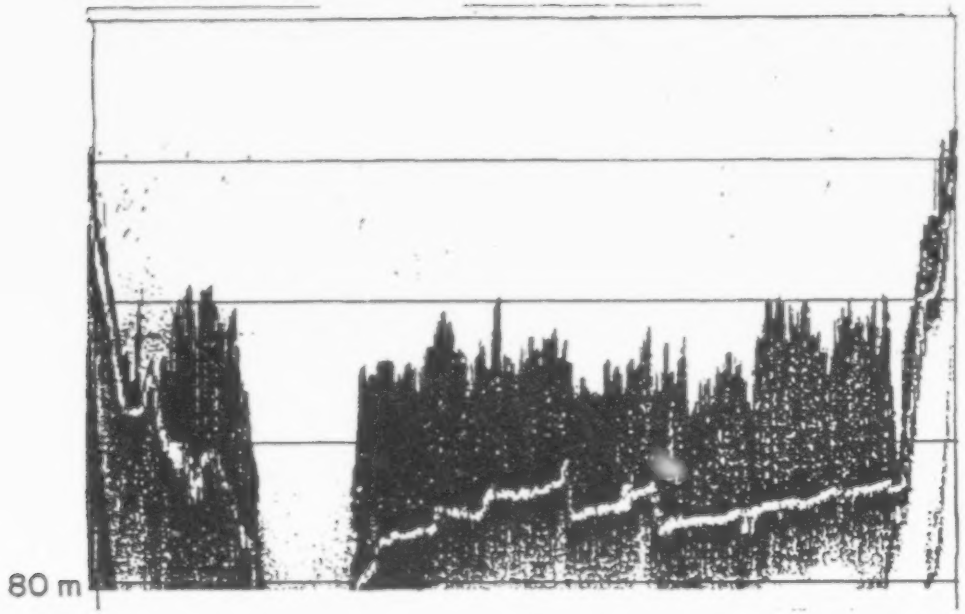
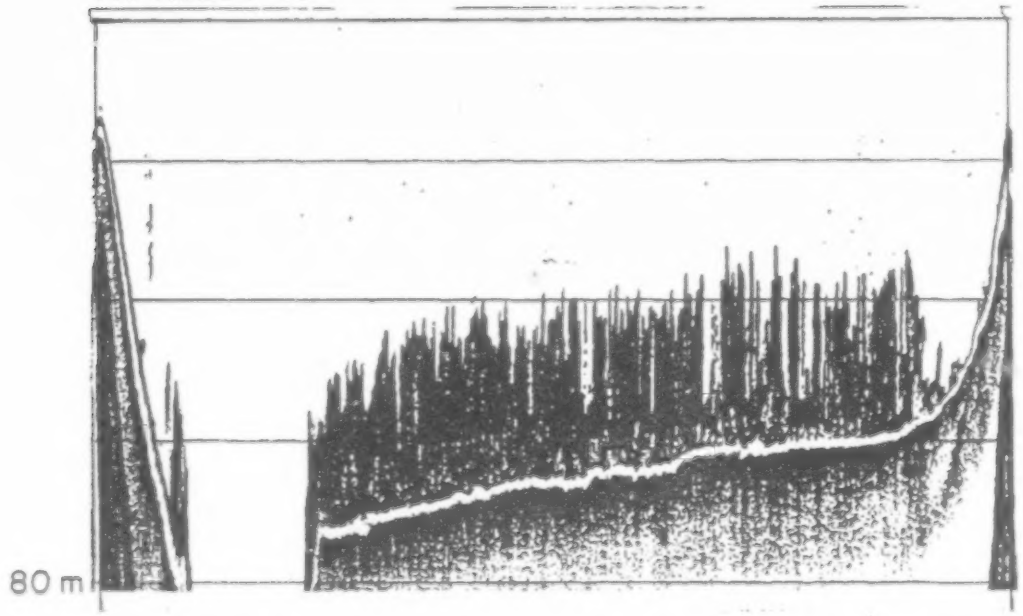


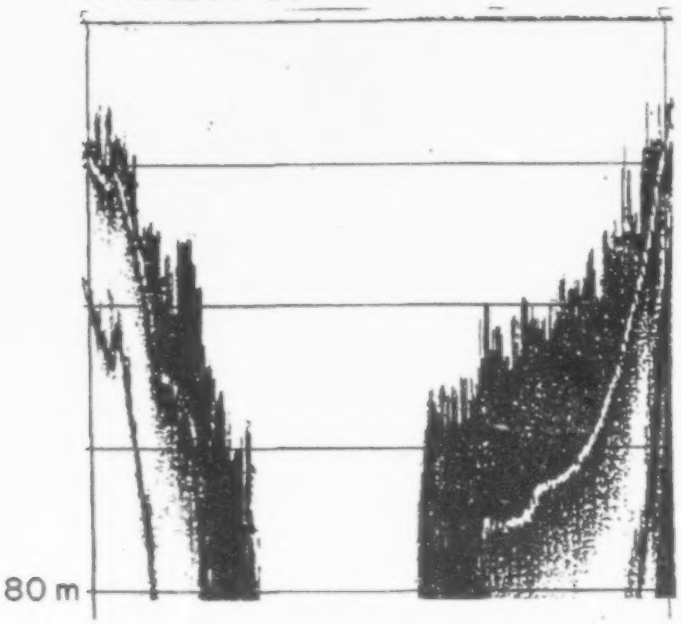
TRANSECT 48



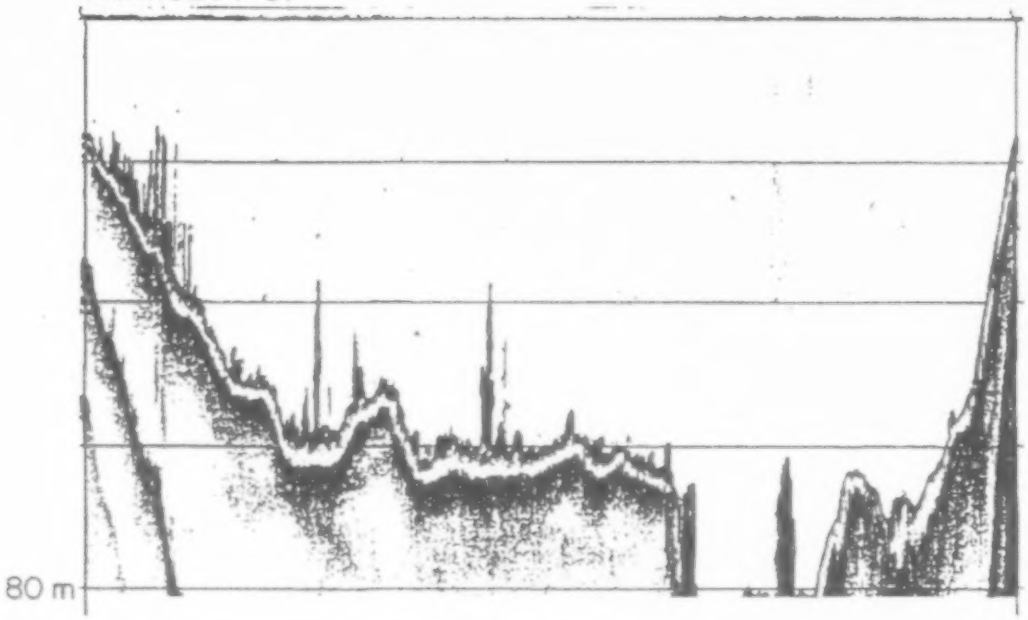
TRANSECT 49



TRANSECT 50



TRANSECT 51



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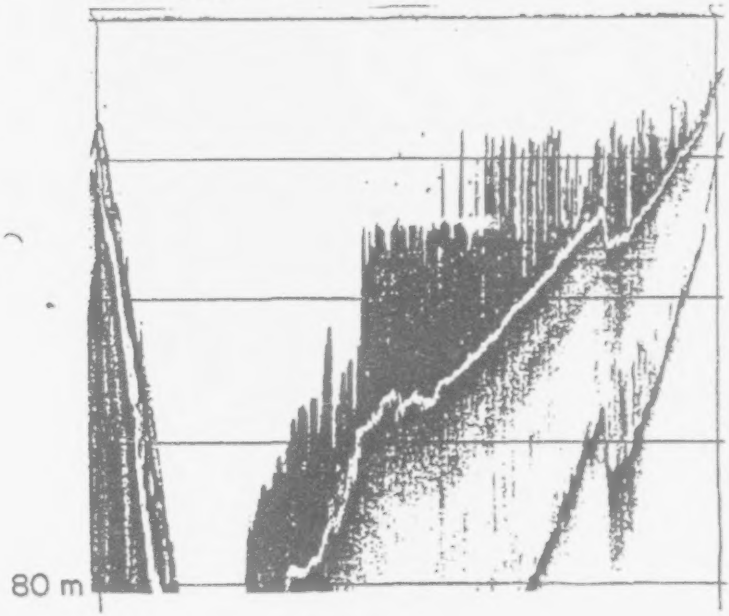
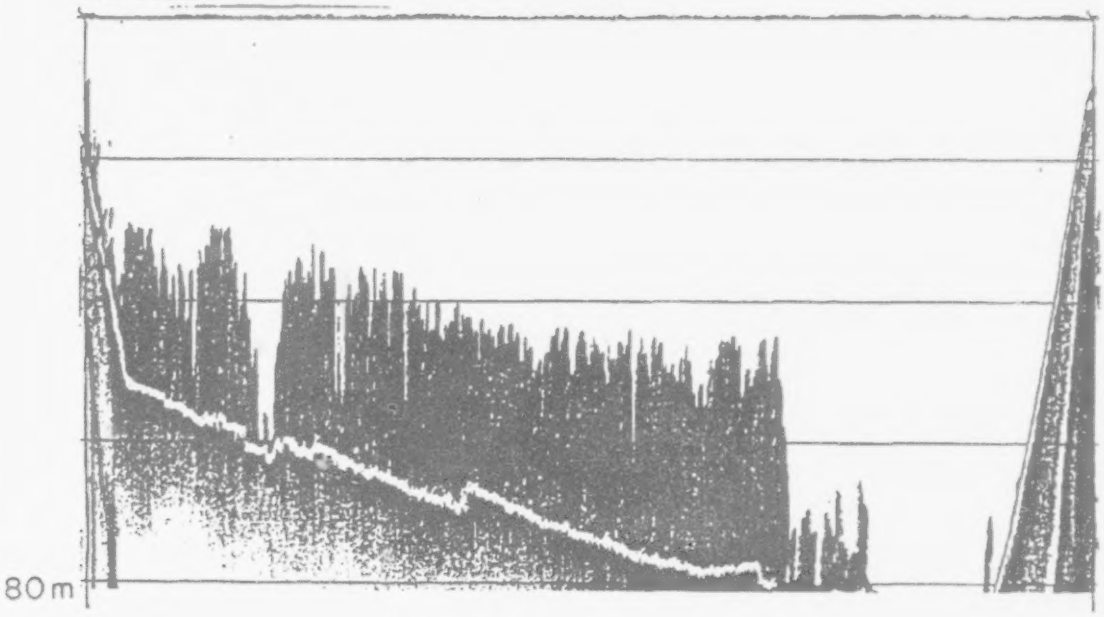
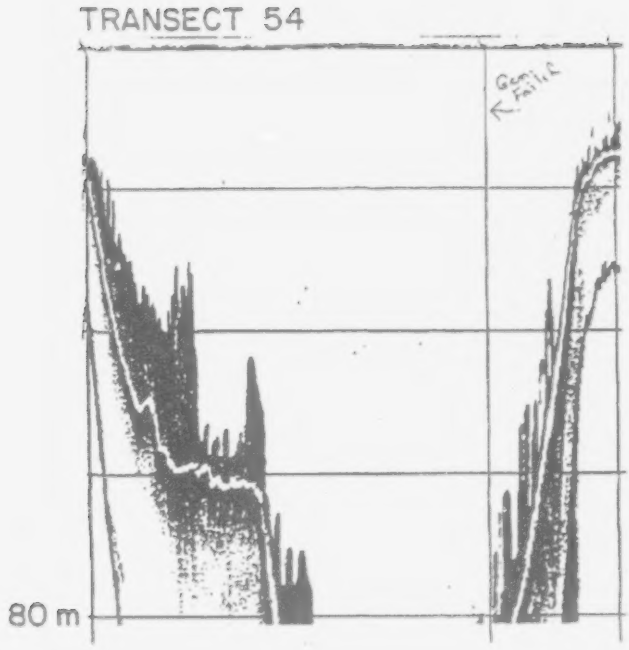
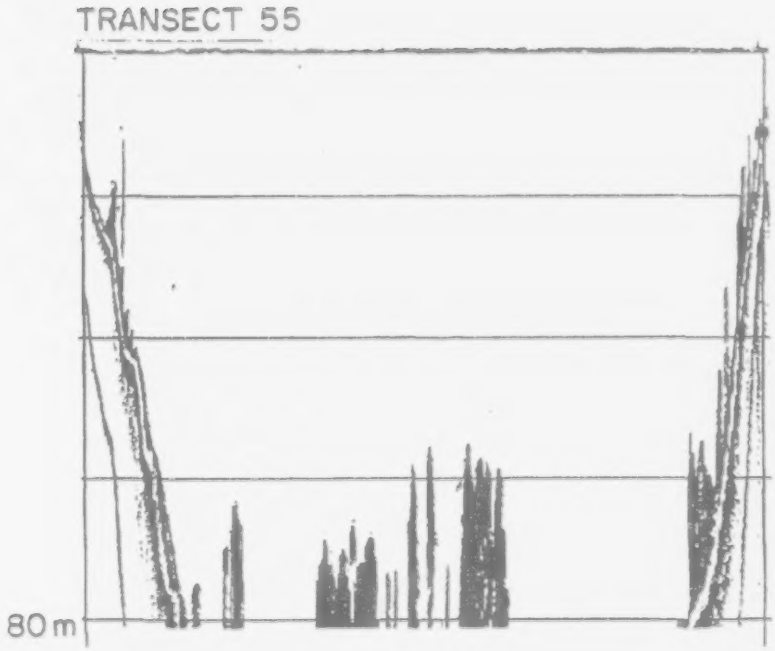


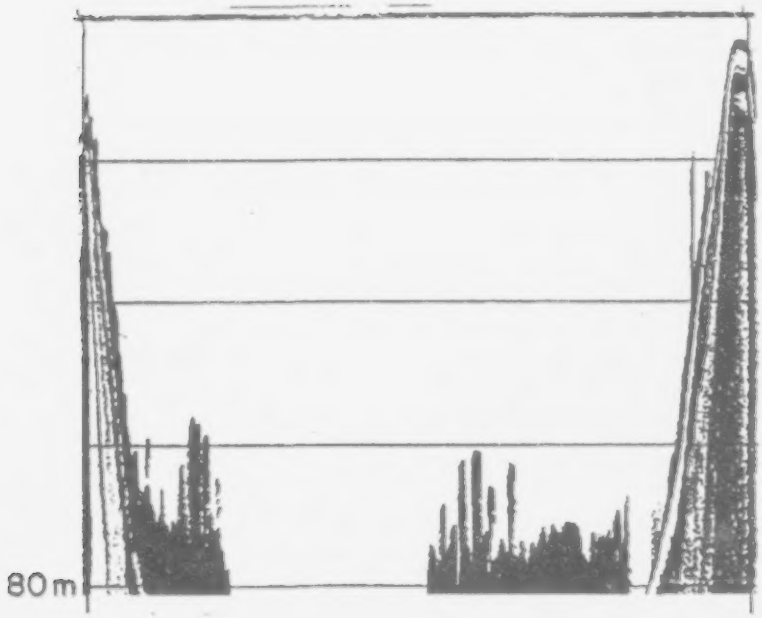
TRANSECT 53



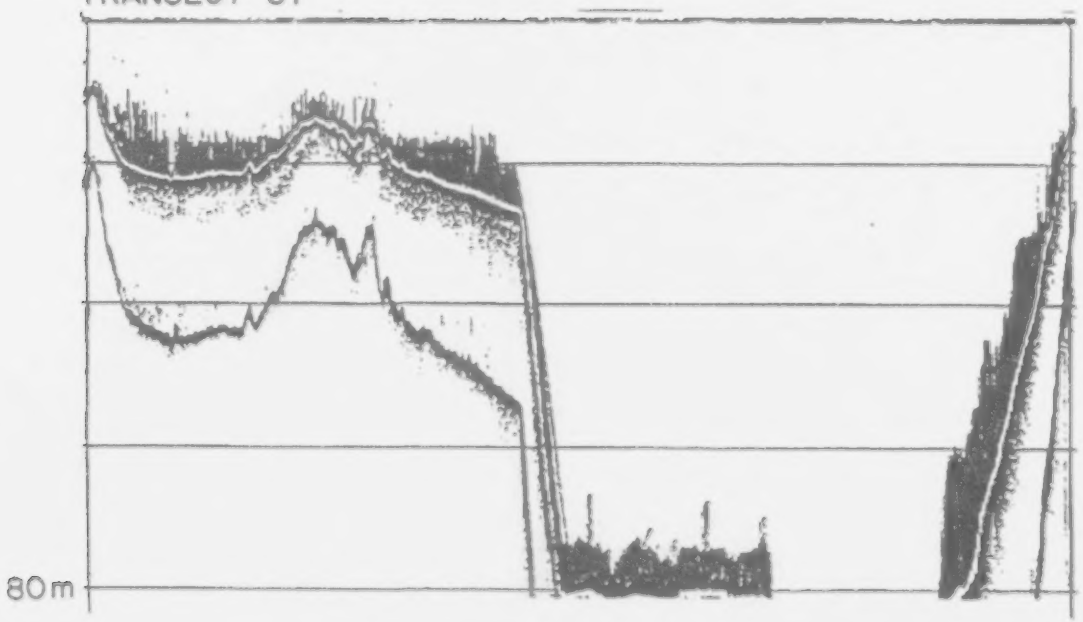

TRANSECT 54
80 m


TRANSECT 55
80 m

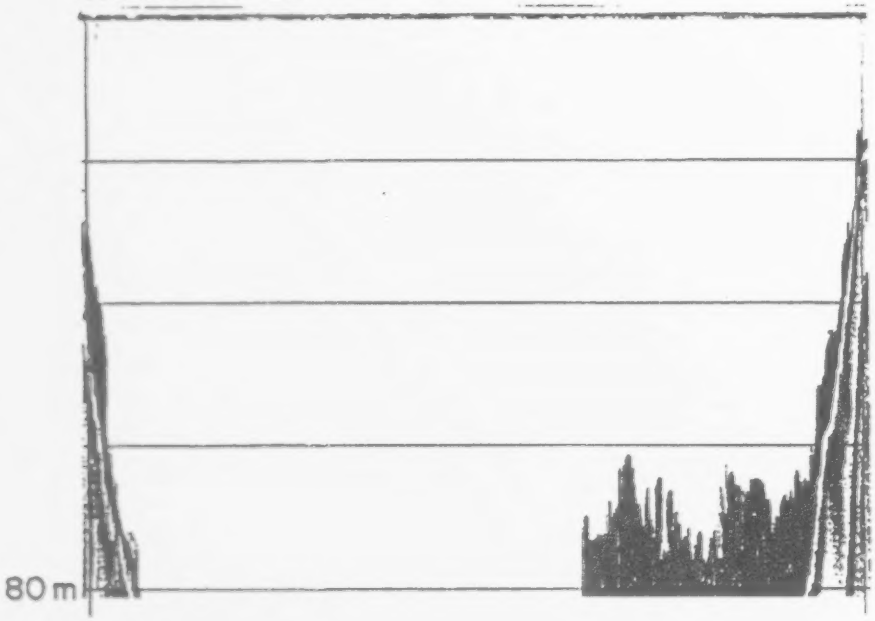
TRANSECT 56



TRANSECT 57



TRANSECT 58



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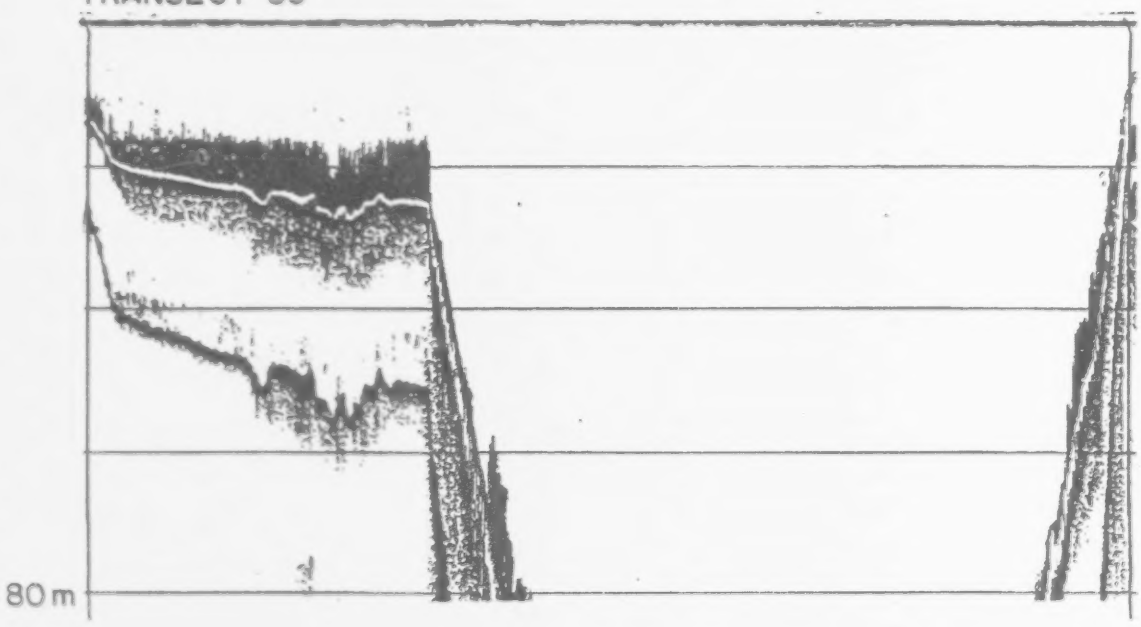
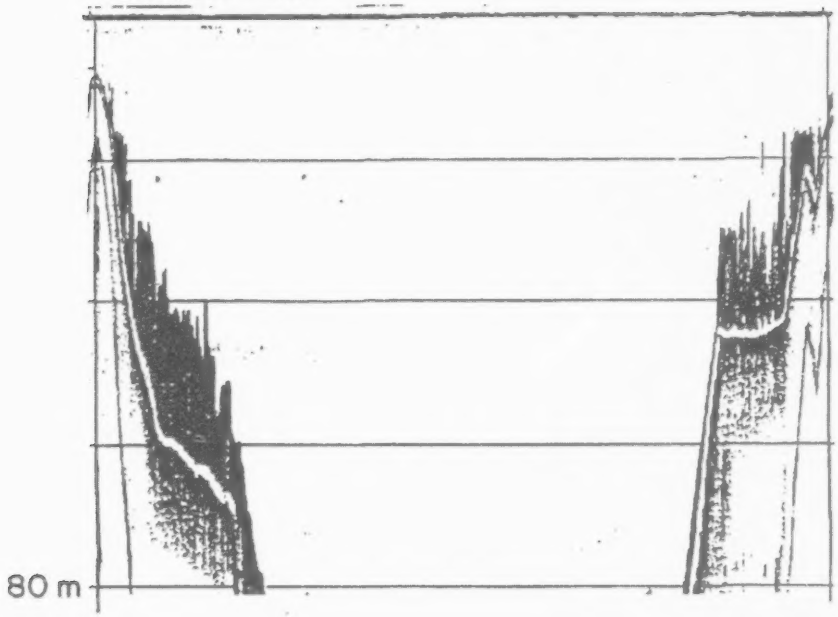
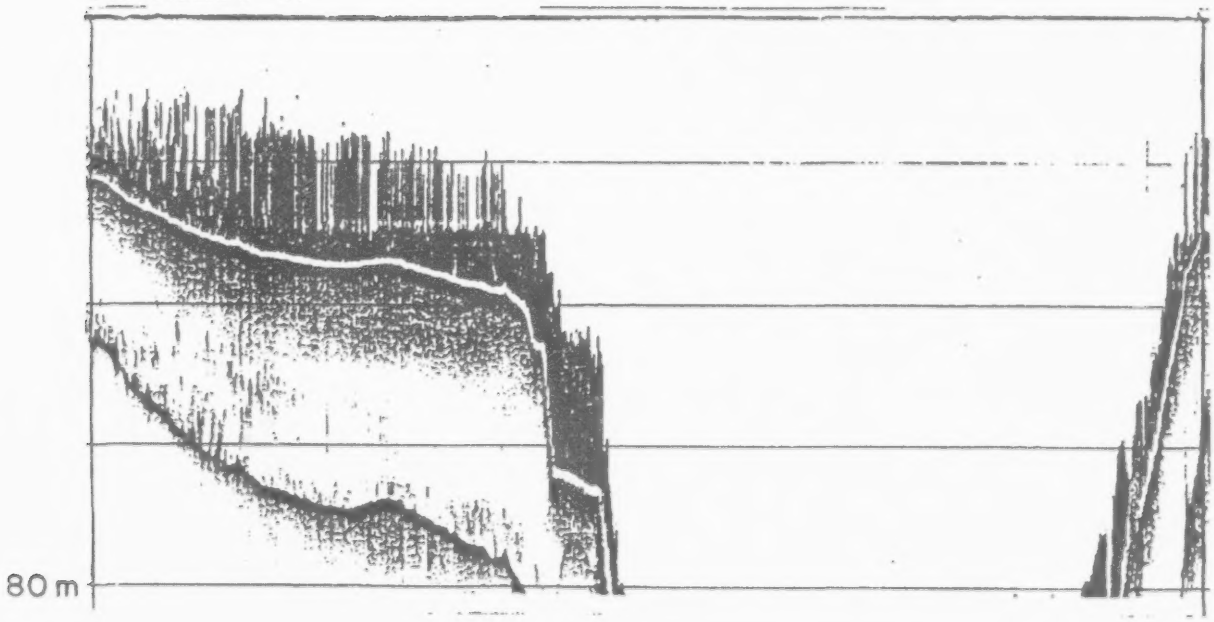
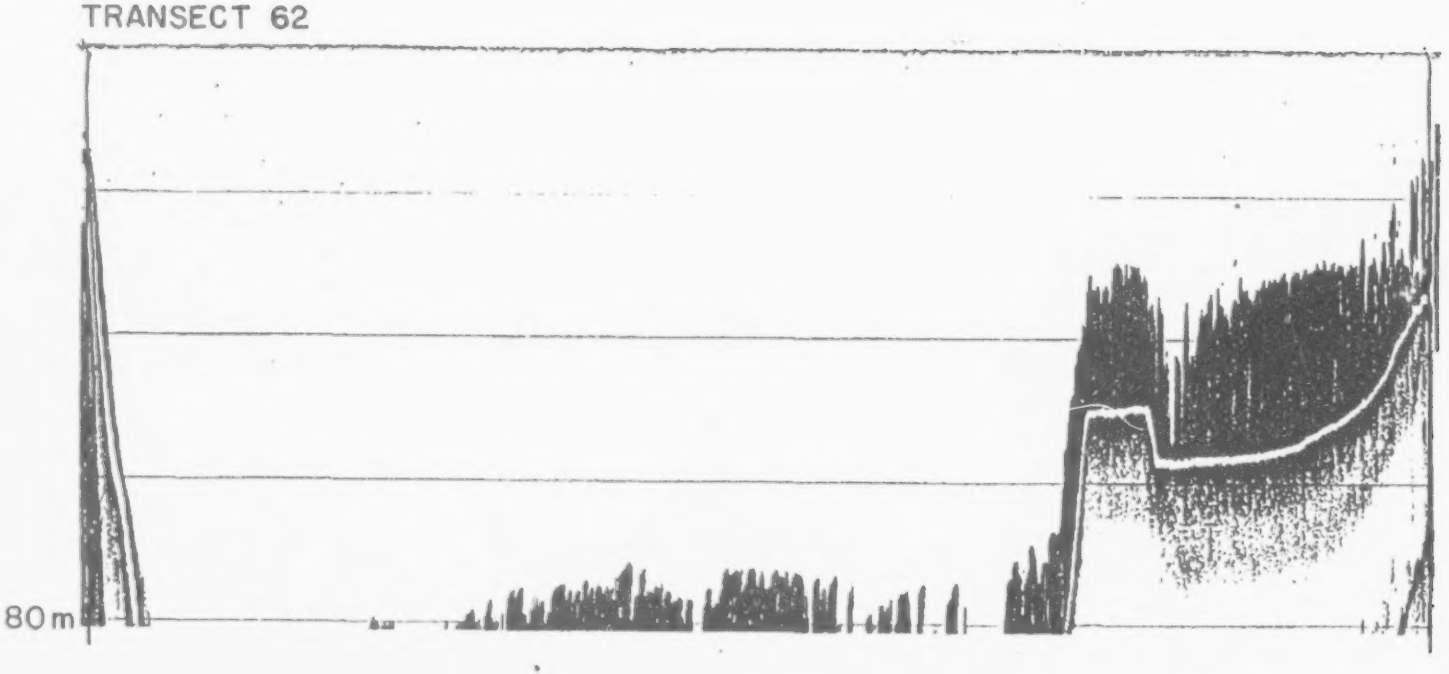


TRANSECT 60

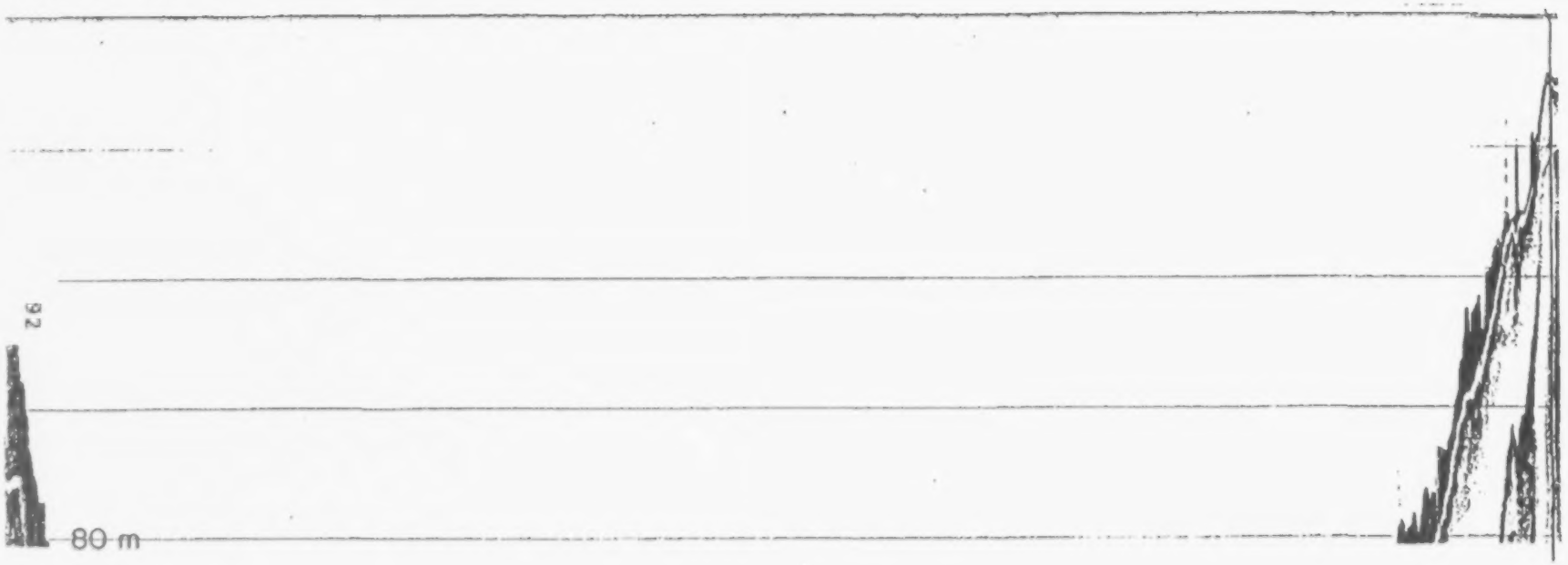


TRANSECT 61

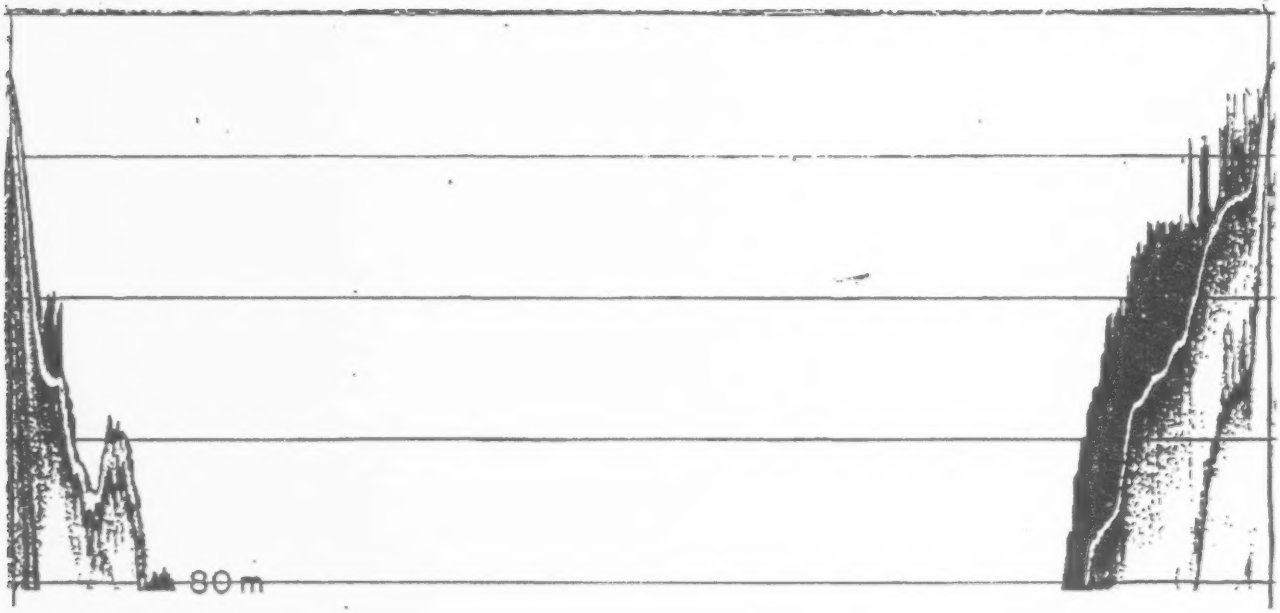



TRANSECT 62
80m

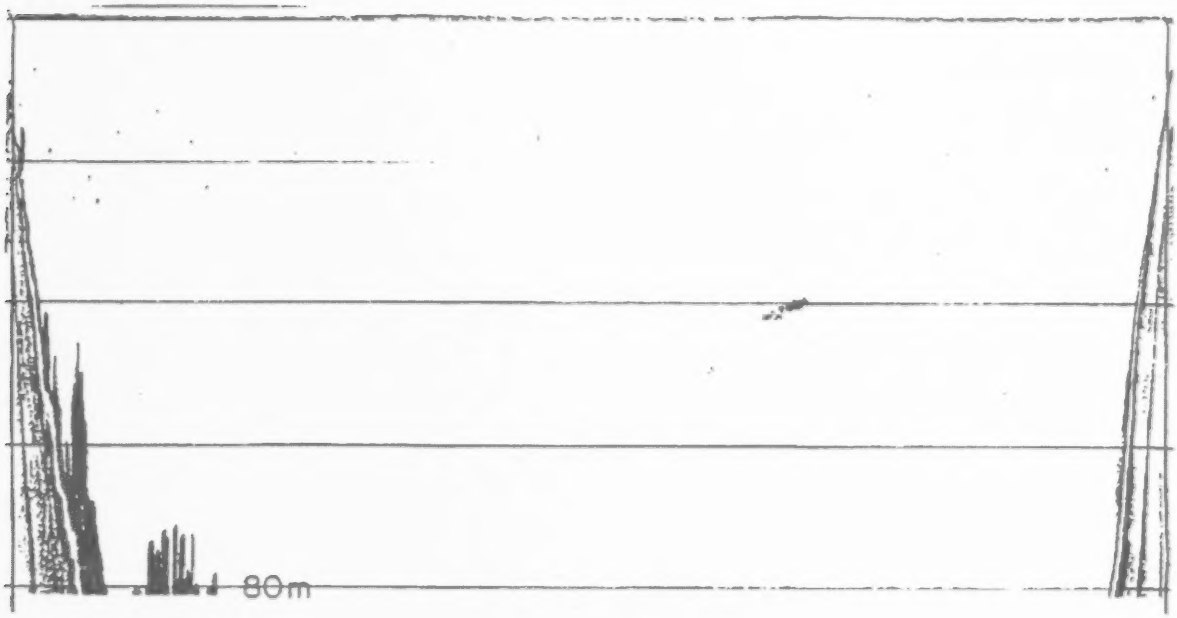
RANSECT 63

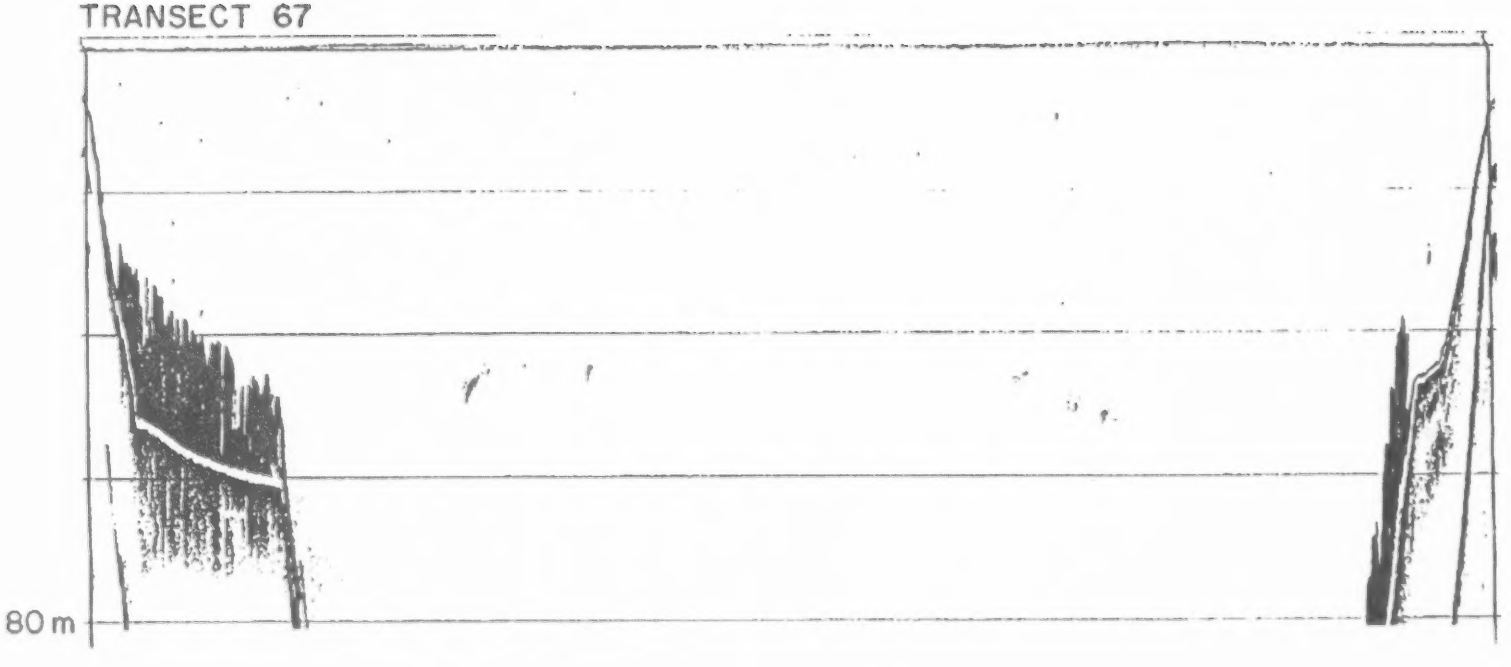


TRANSECT 64

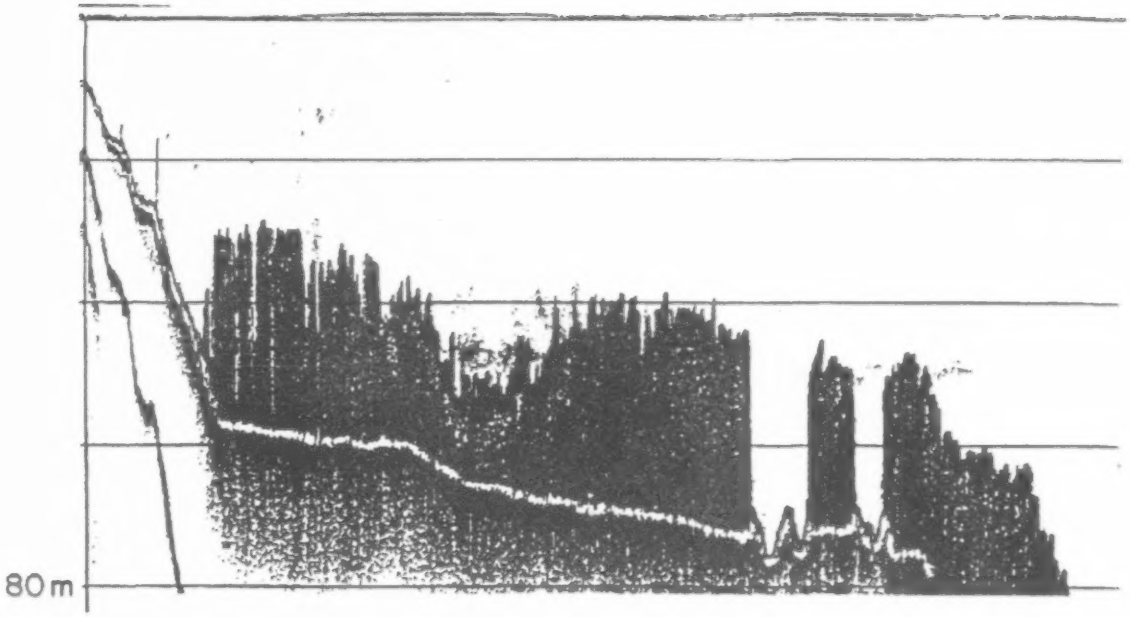
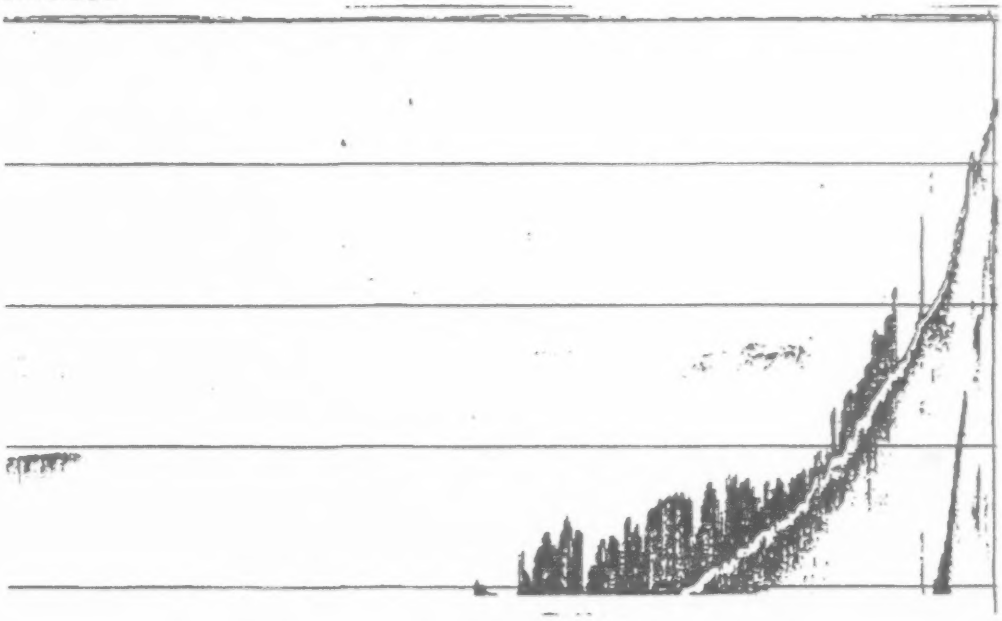


TRANSECT 65




TRANSECT 67
80 m

TRANSECT 69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